

Q V
18
5849c
1894

QUIZ-COMPENDS

PHARMACY

STEWART



NLM 00068526 2

ARD TEXT=BOOKS.

1 2236 Illustrations, many of which
 inted in Colors.

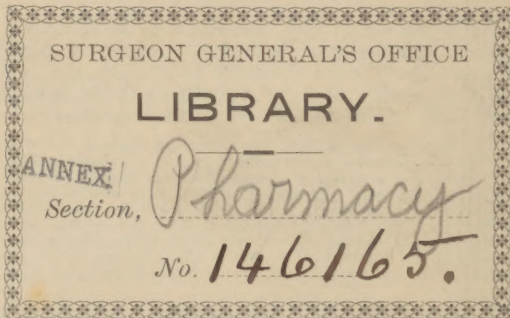
MOULLIN. Surgery. Second Edition, by Hamilton. A Complete Text-Book. By C. W. MANSELL MOULLIN, M.A., M.D. OXON., F.R.C.S., Surgeon and Lecturer on Physiology to the London Hospital; formerly Radcliffe Traveling Fellow and Fellow of Pembroke College, Oxford. Second American Edition. Revised and edited by JOHN B. HAMILTON, M.D., LL.D., Professor of the Principles of Surgery and Clinical Surgery, Rush Medical College; Professor of Surgery, Chicago Polyclinic; Surgeon, formerly Supervising Surgeon-General, U. S. Marine Hospital Service; Surgeon to Presbyterian Hospital; Consulting Surgeon to St. Joseph's Hospital and Central Free Dispensary, Chicago, etc. With Colored Frontispiece. *600 Illustrations, over 200 of which are original, and many of which are printed in Colors. Royal Octavo. 1200 pages. Handsomely bound in Cloth, *Net*, \$7.00; Leather, *Net*, \$8.00 Half Russia Crushed, Marbled edges and linings, *Net*, \$9.00

"The aim to make this valuable treatise practical by giving special attention to questions of treatment has been admirably carried out. Many a reader will consult the work with a feeling of satisfaction that his wants have been understood, and that they have been intelligently met. The author well knows his subject."—*Medical Sciences.*

MORRI
 are
 Ana
 on A

Written
 and edited
 sex Hospi
 original so
 been spare
 tures and
 the result c
 of studying
 by JACOBS
 for dissecti

LANDO



nich
 ical
 turer

9.50

world,
 ddle-
 y but
 aving
 struc-
 , and
 thods
 omy.
 anual

lus-
 man

trations, many of which are
 Physiology, including Histology and Microscopical Anatomy, with
 special reference to the requirements of Practical Medicine. By
 Dr. L. LANDOIS, Professor of Physiology and Director of the Physiological
 Institute, University of Greifswald. Translated from the Seventh German
 Edition, with additions by WILLIAM STERLING, M.D., Sc.D., Brackenbury
 Professor of Physiology and History in Owen's College and Victoria
 University, Manchester; Examiner in the Honors' School of Science, Uni-
 versity of Oxford, England. Fourth Edition, Revised and Enlarged.
 Royal Octavo. Cloth, \$7.00; Leather, \$8.00

"Landois' Physiology is, without question, the best text-book on the subject that has
 ever been written."—*New York Medical Record.*

Complete Circulars and Sample Pages of these Books sent upon application.

Valuable Handbooks.

ROBINSON. THE LATIN GRAMMAR OF PHARMACY AND MEDICINE. By H. D. ROBINSON, PH.D., Professor of Latin Language and Literature, University of Kansas, Lawrence. With an Introduction by L. E. SAYRE, PH.G., Professor of Pharmacy, and Dean of the Dept. of Pharmacy in the University of Kansas, and including two extensive vocabularies, English Latin and Latin-English. 12mo. 275 pages. Cloth, \$2.00

"It is a work that meets with my hearty approval. There is great need of just such a book in our American schools of pharmacy and medicine."—*E. S. Bastin, Professor of Botany, Dept. of Pharmacy, Northwestern University, Chicago.*

"The object of this useful book is a very laudable one, namely, to improve, if possible, the Latin used by both physicians and druggists, chiefly in the prescribing of drugs. While it is true that many of the profession find it unnecessary to remember the genitive endings of words used in medicine, because of the customary abbreviations in prescribing-writing, there are others who frequently desire to write their directions to the druggist in Latin, in order that the patient may not learn of facts about which it is often necessary for him to remain in ignorance. We hope that the book will prove a success, and by its general employment in both pharmaceutical and medical schools improve the knowledge of Latin in both professions."—*The Medical News, Philadelphia, Jan. 10, 1891.*

BARTLEY. MEDICAL CHEMISTRY. Second Edition. A Text-Book for Medical, Dental, and Pharmaceutical Students. By E. H. BARTLEY, M.D., Professor of Chemistry and Toxicology at the Long Island College Hospital; late Chief Chemist, Board of Health of Brooklyn, N. Y., etc. Revised and Enlarged. With 62 Illustrations. Glossary and Complete Index. 423 pages. 12mo. Cloth, \$2.50

"Of this work it may be said that it is condensed without being abrupt, it is detailed without verbosity, and all the instructions are given clearly and distinctly. The oldest and most accomplished physician will be well repaid in having it for a book of reference, while the student will find that it will lighten the burden which, of necessity, he is compelled to carry. It is completed by an excellent set of tables and an index."—*Louisville Medical News.*

DAVIS. A MANUAL OF PRACTICAL OBSTETRICS. 140 Illustrations, including Several Plates. By EDWARD P. DAVIS, A.M., M.D., Clinical Lecturer on Obstetrics in the Jefferson Medical College; Professor of Obstetrics and Diseases of Children in the Philadelphia Polyclinic; Visiting Obstetrician to the Philadelphia Hospital; Physician to the Children's Department of the Howard Hospital; Member of the American Gynecological Society. 12mo. Cloth, \$2.00

"This manual is, unlike many of its class, not a mere compilation, but contains a number of practical hints not usually found in larger works. The chapters on the diagnosis of pregnancy, the treatment of normal and premature labor, operative obstetrics, the puerperal state, and post-partum hemorrhage commend themselves especially by their clearness and conciseness. If the advice given in Chapter VI, on the examination of patients before the beginning of labor, were generally followed there would be an immense difference in the maternal and foetal mortality. The chapter on the laceration of the perineum and pelvic floor is a useful one. The style is clear and concise, the illustrations helpful; in fact, the work is one which deserves, and will obtain, a wide circulation."—*The Medical Record, January 16, 1892.*

MANUAL FOR SELF-EXAMINATION. Being 3000 Questions on Medical Subjects, Anatomy, Physiology, Materia Medica, Therapeutics, Chemistry, Surgery, Practice, Obstetrics, Gynecology, Diseases of Children, etc., with References to the Correct Answers. 64mo. Cloth, Net, 10 cts.

"With this little work the student can Quiz himself in every department of medicine—and he can do it as thoroughly as a skillful Quiz-master can do it. When we were a student we would have hailed with the greatest pleasure a little work like this one. We advise every medical student to secure a copy of this work and make daily use of it."—*Cincinnati Medical News, September 29, 1891.*

**P. BLAKISTON, SON & CO., Publishers and Booksellers,
1012 WALNUT STREET, PHILADELPHIA.**

FROM PROF. J. M. DAcOSTA.—“I find it an excellent work, doing credit to the learning and discrimination of the author.”

A NEW MEDICAL DICTIONARY.



Compact and concise, including all the Words and Phrases used in medicine, with Pronunciation and Definitions.

BASED ON RECENT MEDICAL LITERATURE.

BY

GEORGE M. GOULD, A.B., M.D.,

Ophthalmic Surgeon to the Philadelphia Hospital, Clinical Chief Ophthalmological Dept., German Hospital, Philadelphia.

SEVERAL THOUSAND NEW WORDS

NOT CONTAINED IN ANY
SIMILAR WORK.

Small, Square 8vo, Half Morocco, as above,
with Thumb Index, . . . \$4.25
Plain Dark Leather, without Thumb Index, 3.25

Among others IT CONTAINS TABLES of the ARTERIES, of the BACILLI, giving the Name, Habitat, etc.; of GANGLIA, LEUCOMAÏNES, MICROCOCCI, MUSCLES, NERVES, PLEXUSES, PTOMAÏNES, with the Name, Formula, Physiological Action, etc.; COMPARISON OF THERMOMETERS; WEIGHTS AND MEASURES, of VITAL STATISTICS, etc.

OPINIONS OF PROMINENT MEDICAL TEACHERS.

“The compact size of this dictionary, its clear type, and its accuracy are unfailing pointers to its coming popularity.”—*John B. Hamilton, Supervising Surgeon-General U. S. Marine Hospital Service, Washington.*

“It is certainly as convenient and as useful a volume as can be found, regarding contents as well as arrangement.”—*Julius Pohlman, Prof. of Physiology, University of Buffalo.*

“I have examined it with considerable care, and am very much pleased with it. It is a handy book for reference, and so far as I have examined it, it is accurate in every particular.”—*E. H. Bartley, Prof. of Chemistry, Long Island College Hospital, Brooklyn.*

“I consider this the dictionary of all others for the medical student, and shall see that it is placed on our list of text-books.”—*A. R. Thomas, M.D., Dean Hahnemann Medical College, Philadelphia.*

“It will be recommended among our text-books in our new catalogue.”—*S. E. Chaillé, M.D., Dean Medical Dept., Tulane University, New Orleans.*

“Compact, exact, up to date, and the tables are most excellent and instructive. I prefer it to the larger and older books.”—*Prof. C. B. Parker, Medical Dept., Western Reserve University, Cleveland.*

“I have given your ‘New Medical Dictionary’ a critical examination. Its size has made it convenient to the study table and handy for frequent use. At the same time it is comprehensive as to the number of words, including those of the latest coinage, and concise in its definitions. The etymology and accentuation materially enhance its value, and help to make it worthy a place with the classical books of reference for medical students.”—*J. W. Holland, M.D., Dean Jefferson Medical College, Philadelphia.*

Students will find this an extremely useful book of reference. The anatomical tables will be of great use in memorizing the arteries, muscles, etc.

From The Southern Clinic.

"We know of no series of books issued by any house that so fully meets our approval as these ?Quiz-Compend? . They are well arranged, full, and concise, and are really the best line of text-books that could be found for either student or practitioner."

BLAKISTON'S ?QUIZ=COMPENDS?

The Best Series of Manuals for the Use of Students

Price of each, Cloth, \$1.00. Interleaved, for taking Notes, \$1.25.

These Compends are based on the most popular text-books and the lectures of prominent professors, and are kept constantly revised, so that they may thoroughly represent the present state of the subjects upon which they treat.

The authors have had large experience as Quiz-Masters and attaches of colleges, and are well acquainted with the wants of students.

They are arranged in the most approved form, thorough and concise, containing over 550 fine illustrations, inserted wherever they could be used to advantage.

Can be used by students of any college.

They contain information nowhere else collected in such a condensed, practical shape.

Illustrated Circular Free.

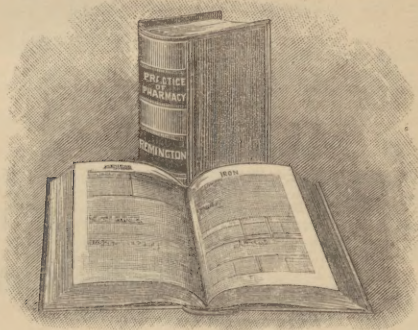
- No. 1. **HUMAN ANATOMY.** Fifth Revised and Enlarged Edition. Including Visceral Anatomy. Can be used with either Morris' or Gray's Anatomy. 117 Illustrations and 16 Lithographic Plates of Nerves and Arteries, with Explanatory Tables, etc. By SAMUEL O. L. POTTER, M. D., Professor of the Practice of Medicine, Cooper Medical College, San Francisco; late A. A. Surgeon, U. S. Army.
- No. 2. **PRACTICE OF MEDICINE.** Part I. Fourth Edition, Revised, Enlarged, and Improved. By DAN'L E. HUGHES, M. D., Physician-in-Chief, Philadelphia Hospital, late Demonstrator of Clinical Medicine, Jefferson Medical College, Philadelphia.
- No. 3. **PRACTICE OF MEDICINE.** Part II. Fourth Edition, Revised, Enlarged, and Improved. Same author as No. 2.
- No. 4. **PHYSIOLOGY.** Seventh Edition, with new Illustrations and a table of Physiological Constants. Enlarged and Revised. By A. P. BRUBAKER, M. D., Professor of Physiology and General Pathology in the Pennsylvania College of Dental Surgery; Demonstrator of Physiology, Jefferson Medical College, Philadelphia.
- No. 5. **OBSTETRICS.** Fifth Edition. By HENRY G. LANDIS, M. D. Revised and Edited by WM. H. WELLS, M. D., Ass't Demonstrator of Obstetrics, Jefferson Medical College, Philadelphia. Enlarged. 47 Illustrations.
- No. 6. **MATERIA MEDICA, THERAPEUTICS, AND PRESCRIPTION WRITING.** Fifth Revised Edition. By SAMUEL O. L. POTTER, M. D., Professor of Practice, Cooper Medical College, San Francisco; late A. A. Surgeon, U. S. Army.
- No. 7. **GYNÆCOLOGY.** A New Book. By WM. H. WELLS, M. D., Ass't Demonstrator of Obstetrics, Jefferson College, Philadelphia. Illustrated.
- No. 8. **DISEASES OF THE EYE AND REFRACTION.** Second Edition. Including Treatment and Surgery. By L. WEBSTER FOX, M. D., and GEORGE M. GOULD, M. D. With 39 Formulæ and 71 Illustrations.
- No. 9. **SURGERY, Minor Surgery, and Bandaging.** Fifth Edition, Enlarged and Improved. By ORVILLE HORWITZ, B. S., M. D., Clinical Professor of Genito-urinary Surgery and Venereal Diseases in Jefferson Medical College; Surgeon to Philadelphia Hospital, etc. With 98 Formulæ and 167 Illustrations.
- No. 10. **CHEMISTRY.** Inorganic and Organic. Third Edition. Including Urinalysis, Animal Chemistry, Chemistry of Milk, Blood, Tissues, the Secretions, etc. By HENRY LEFFMANN, M. D., Professor of Chemistry in Pennsylvania College of Dental Surgery and in the Woman's Medical College, Philadelphia.
- No. 11. **PHARMACY.** Fourth Edition. Based upon Prof. Remington's Text-Book of Pharmacy. By F. E. STEWART, M. D., PH. G., late Quiz-Master in Pharmacy and Chemistry, Philadelphia College of Pharmacy; Lecturer at Jefferson Medical College. Carefully revised in accordance with the new U. S. P.
- No. 12. **VETERINARY ANATOMY AND PHYSIOLOGY.** Illustrated. By WM. R. BALLOU, M. D., Professor of Equine Anatomy at New York College of Veterinary Surgeons; Physician to Bellevue Dispensary, etc. With 29 graphic Illustrations.
- No. 13. **DENTAL PATHOLOGY AND DENTAL MEDICINE.** Second Edition, Illustrated. Containing all the most noteworthy points of interest to the Dental Student and a Section on Emergencies. By GEO. W. WARREN, D. D. S., Chief of Clinical Staff, Pennsylvania College of Dental Surgery, Philadelphia.
- No. 14. **DISEASES OF CHILDREN.** Colored Plate. By MARCUS P. HATFIELD, Professor of Diseases of Children, Chicago Medical College.
- No. 15. **GENERAL PATHOLOGY AND MORBID ANATOMY.** 65 Illustrations. By H. NEWBERRY HALL, PH. G., M. D., Professor of Pathology and Medical Chemistry, Chicago Post Graduate Medical School.

Price, each, \$1.00. Interleaved, for taking Notes, \$1.25.

P. BLAKISTON, SON & CO., 1012 Walnut St., Philadelphia.

"There is no treatise on Pharmacy in the English language which can approach it in completeness or usefulness."—AMERICAN DRUGGIST.

PRACTICE OF PHARMACY.



A Treatise on the Modes of Making and Dispensing Official, Unofficial, and Extemporaneous Preparations, with Descriptions of their Properties, Uses, and Doses. Intended as a Hand-Book for Pharmacists and Physicians, and a Text-Book for Students.

By Prof. JOSEPH P. REMINGTON, Ph.G.

SECOND EDITION.

1300 pages, nearly 650 Illustrations. 8vo. Cloth, \$6.00; Sheep, \$6 50

FOR SALE BY ALL BOOKSELLERS AND WHOLESALE DRUGGISTS.

"We make no mistake when we assert that it is the best work on pharmacy that has ever been prepared. The subject of pharmacy in its treatment, description, language, and illustration is more complete, full, precise, and satisfactory than any other, and will hold the attention of the student as a guide into the mysteries he has not heretofore comprehended, while to the experienced pharmacist it will prove a help and constant reference of reliable value."

Pharmaceutical Record, New York.

"The arrangement of the book is excellent. It is remarkable, apart from its intrinsic value, from the fact that the author, as a practical pharmacist, runs a drug-store, and at the same time professes and demonstrates the theory and practice of pharmacy in a college. The fitness of such a man to write a book is unquestionable. The wonder is where the author found time in his busy life to write such a book."

Chemist and Druggist, London, Eng.

FOR SALE BY

P. BLAKISTON, SON & CO.,

1012 Walnut Street, Philadelphia.

A
COMPEND
OF
PHARMACY.

BY

F. E. STEWART, M.D., PH.G.,

LECTURER AND DEMONSTRATOR IN MATERIA MEDICA AND PHARMACY, JEFFERSON
MEDICAL COLLEGE, PHILADELPHIA; FORMERLY QUIZ-MASTER IN CHEMISTRY
AND THEORETICAL PHARMACY IN THE PHILADELPHIA COLLEGE OF PHAR-
MACY; INSTRUCTOR OF PHARMACY AND MATERIA MEDICA IN THE
MEDICO-CHIRURGICAL COLLEGE OF PHILADELPHIA; LECTURER
ON, AND DEMONSTRATOR OF, PHARMACY IN THE
WOMAN'S MEDICAL COLLEGE OF PENNSYLVANIA.

BASED UPON PROF. JOSEPH P. REMINGTON'S
"TEXT-BOOK OF PHARMACY"

AND THE

UNITED STATES PHARMACOPŒIA OF 1890.

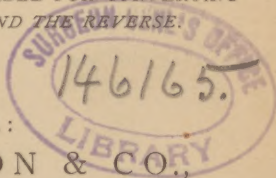
FOURTH REVISED EDITION.

WITH A VERY COMPLETE INDEX, AND TABLE FOR CONVERTING
ENGLISH MEASURES INTO METRIC AND THE REVERSE.

PHILADELPHIA:
P. BLAKISTON, SON & CO.,

1012 WALNUT STREET.

1894.



Annex

QV

18

S849c

1894

Film no. 10059, Item 4

COPYRIGHT, 1893, BY P. BLAKISTON, SON & CO.

PREFACE TO FOURTH EDITION.

Owing to the late appearance of the U. S. P., of 1890, this edition of the Compend, which embraces the essential features of the new Pharmacopœia, has been delayed. The valuable features which made the third edition so popular have been retained, including the comparative tables of weights and measures kindly furnished by the United States Coast and Geodetic Survey. The second part of the work is intended for students' memoranda, not for working formulæ to be used in the laboratory. On that account I have retained in many cases the method of denominating quantities by the letter "p." Referring to solids "p" means parts by weight. When applied to liquids its signification is parts by volume. This renders the work intelligible to all, while it does not in the least detract from its value to the student of the new Pharmacopœia with its change to the metric system. The book will therefore still serve as a method of "brushing up" the memory, as one correspondent graphically puts it, whether the English or French system of weights and measures be employed.

F. E. STEWART.

PREFACE TO FIRST EDITION.

The collection of substances employed in medicine is called the *MATERIA MEDICA*: the substances themselves are known as drugs. *PHARMACY* is the science of preparing these substances; *THERAPY* is the science of applying them to the treatment of the sick. These three branches are properly classified under the general head *PHARMACOLOGY*, or the *SCIENCE OF DRUGS*.

To prepare drugs properly, a knowledge of their properties is necessary. The pharmacist must have a knowledge of their physical properties to identify them, of their chemical properties to select the proper menstrua for extracting their medicinal virtues, and a knowledge of their therapeutical properties to prepare them in the best manner to meet the indications of a rational therapeutics. The neglect of this latter branch on the part of the pharmacist has too often resulted in a sacrifice of therapeutic efficacy to obtain pharmaceutical elegance. The former is the principal object to aim for, though the latter is very important, for it is apparent that the most elegant pharmaceutical preparation, if it have not therapeutic value, is worse than useless.

The importance of studying these three branches together will, therefore, be appreciated. Works on pharmacy recognize this importance to a greater or less degree, and embrace, in proportion as the author views the subject from this point of view, a comprehensive Pharmacology. Though, in the opinion of the author, no work has yet been written that brings therapy and modern pharmacy close enough together, it is not his object in the following pages to make the attempt.

It is not the object of a *QUIZ-COMPEND* to teach new facts. It is its object, rather, to present facts already well known to science in a form easy to comprehend, for the purpose of aiding the student in memorizing them. And as the immediate end which the student is seeking to attain is the passing of his examination in a creditable manner—this end has been carefully considered by the author in writing the following pages.

Quizzes are reviews and explanations of the teachings of others. It is the purpose of the author to observe this rule; and in so doing he has followed, in the main, the leadership of his esteemed friend and teacher,

Professor Joseph P. Remington, of the Philadelphia College of Pharmacy, whose excellent work in the Committee for the Revision of the United States Pharmacopœia, and on the United States Dispensatory, and more recently displayed in his masterly treatise, "The Practice of Pharmacy," justly entitle him to the great reputation which he has acquired as one of the greatest of modern teachers in the branch of knowledge under consideration.

Finally, it must be remembered that a QUIZ-COMPEND is not a *text-book*. It is intended for the sole purpose of aiding the student in connection with his lecturer and text-book, and will not do as a substitute for either.

F. E. STEWART.

CONTENTS.

INTRODUCTION.	PAGES
PHARMACOPŒIAS AND DISPENSATORIES.—Nomenclature. Dispensatories, . . .	1-3
PART I.	
METROLOGY.—Weighing. Measuring. The Metric System. The Gramme and Cubic Centimeter. The Balance. Measuring Liquids. Specific Gravity. Methods of taking Specific Gravity,	4-11
HEAT.—Nature of Heat. Apparatus for Generating Heat. Fuel. Methods of Measuring Heat. Thermometers. Blowpipe. Crucible. Apparatus used to Modify or Control Heat. Steam Heating in Pharmacy,	11-14
OPERATIONS REQUIRING HEAT.—Vaporization—Boiling. Tension of Matter. Rapidity of Evaporation. Evaporation to Fixed Weight and Volume. Distillation—Apparatus and Methods. Sublimation. Desiccation,	14-17
OPERATIONS NOT REQUIRING HEAT.—Comminution—Drug Mills. Trituration. Levigation. Elutriation. Pulverization by Intervention,	17-19
SOLUTION.—Solution of Solids. Solvents used in Pharmacy. Solution of Gases in Water,	19
SEPARATION OF FLUIDS FROM SOLIDS.—Lotion. Decantation. Colation. Filtration. Definition and Apparatus. Clarification and Decoloration. Separation of Immiscible Fluids. Precipitation. Objects of. Crystallization. Systems of; Meaning of Terms; Methods of; Water of. Granulation and Exsiccation. Dialysis. Maceration. Expression,	19-23
PERCOLATION.—Definition. Familiar Example. Percolation Applied to Pharmacy. Rationale of Process. Menstruum. Percolate. Displacement. Condition in which Soluble Principles Exist in Drugs. Official Directions for Percolation. Forms of Percolators. Degree of Comminution. Moistening the Powder. The Porous Diaphragm. Packing Percolators. Adding the Menstruum. Previous Maceration. Testing the Exhaustion. Choice of Menstrua. Advantages of Percolation. Recovery of Absorbed Menstrua. Controlling the Flow of Percolate. Special Forms of Percolators. Supporting Percolators. Receiving Bottles. Repercolation. Fractional Percolation, . .	23-29
PART II.	
THE FORMS OF PHARMACEUTICAL PREPARATIONS DIRECTED BY THE UNITED STATES PHARMACOPŒIA.—Classification of Official Preparations,	30
LIQUIDS.—Aqueous Solutions—Aqua. Liqueurs. Aqueous Solutions Containing Sweet or Viscid Substances—Syrupi. Mellita. Mucilagines. Misturæ. Glycerite. Alcoholic Solutions—Spiritus. Elixiria. Ethereal Solutions—Collodia. Oleaginous Solutions, or External Applications—Linimenta. Oleata. Aqueous Liquids Made by Percolation or Maceration—Infusa. Decocta. Alcoholic Liquids Made by Percolation or Maceration—Tincturæ. Vina Medicata. Extracta Fluida. Ethereal Liquids Made by Percolation—Oleoresina. Acetous Liquids Made by Percolation—Aceta,	31-42
SOLIDS.—Solid Preparations Made by Percolation or Maceration—Extracta. Abstracta. Resina. Solid Preparations made without Percolation or Maceration—Pulveres. Triturationes. Massæ. Confectiones. Pilulæ. Trochisci. Solid Preparations for External Use—Cerata. Unguenta. Emplastra. Charta. Suppositoria,	42-51

PART III.		PAGES
THE PREPARATIONS OF THE INORGANIC MATERIA MEDICA.		
HYDROGEN, OXYGEN, AND WATER.—Aqua, U. S.,		52
THE INORGANIC ACIDS.—Properties Classes. Medical Properties. Antidotes,		52-56
CHLORINE, BROMINE, AND IODINE.—(The Halogens),		57-58
SULPHUR AND PHOSPHORUS,		58-61
CARBON, BORON, AND SILICON,		61-62
POTASSIUM, SODIUM, LITHIUM, AND AMMONIUM.—Characteristics of Alkalies. Alkali-metals and their Characteristics,		62
POTASSIUM SALTS,		63-67
SODIUM SALTS,		68-73
LITHIUM SALTS,		74
AMMONIUM SALTS,		74-76
MAGNESIUM CALCIUM, AND BARIUM SALTS,		76-80
STRONTIUM SALTS,		80
ZINC, ALUMINUM, CERIUM, AND CADMIUM SALTS,		80-83
MANGANESE, IRON, AND CHROMIUM SALTS,		83-89
NICKEL, COBALT, AND TIN SALTS,		89
LEAD, COPPER, SILVER, AND MERCURY SALTS,		89-95
ANTIMONY, ARSENIC, AND BISMUTH SALTS,		95-98
GOLD AND PLATINUM SALTS,		98-99

PART IV.

THE PREPARATIONS OF THE ORGANIC MATERIA MEDICA.	
Organic Chemistry, the Science of the Carbon Compounds. THE CELLULIN GROUP,	100
PRODUCTS RESULTING FROM THE DECOMPOSITION OF CELLULIN,	101
PRODUCTS RESULTING FROM THE DESTRUCTIVE DISTILLATION OF CELLULIN AND LIGNIN,	101
PRODUCTS RESULTING FROM THE NATURAL DECOMPOSITION OF CELLULIN AND LIGNIN AND THEIR DERIVATIVES,	103
AMYLACEOUS AND MUCILAGINOUS PRINCIPLES AND THEIR PRODUCTS,	105
GUMS AND MUCILAGINOUS SUBSTANCES,	106
SUGARS AND SACCHARINE SUBSTANCES,	108
DERIVATIVES OF SUGAR THROUGH THE ACTION OF FERMENTS.—Fermentation—Two Classes of Ferments. Result of the Action of Dilute Acids and Ferments on Cellulin and Starch,	110
ETHYL HYDRATE AND OXIDE, AND THEIR PREPARATIONS.—Alcohols, Ethers, Compound Ethers,	111
PREPARATIONS OF THE COMPOUND ETHERS OF THE ETHYL AND AMYL SERIES,	113
ALDEHYD, ITS DERIVATIVES AND PREPARATIONS,	115
PRODUCTS OF THE ACTION OF FERMENTS UPON ACID SACCHARINE FRUITS,	116
PROPENYL PREPARATION,	118
ACID SACCHARINE FRUITS CONTAINING PECTINOUS BODIES,	118
VOLATILE OILS.—Terpenes. Oxygenated Volatile Oils. Sulphurated Volatile Oils. Nitrogenated Volatile Oils. Stearopten. Eleopten. Action of Light and Air and of Acids and Alkalies on Volatile Oils. Adulterations. Preparations,	119
OFFICIAL PRODUCTS FROM THE AURANTIACEÆ,	120
OFFICIAL PRODUCTS FROM THE LABIATÆ,	121
OFFICIAL PRODUCTS OF THE AROMATIC UMBELLIFERÆ,	123
OFFICIAL AROMATIC PRODUCTS, WITH THEIR VOLATILE OILS,	124
STEAROPTENS FROM VOLATILE OILS,	127

	PAGES
OFFICIAL SUBSTANCES CONTAINING NITROGENATED AND SULPHURATED OILS, WITH ALLIED PRODUCTS,	128
OFFICIAL DRUGS AND PRODUCTS CONTAINING VOLATILE OIL WITH SOFT RESIN,	130
OFFICIAL DRUGS AND PRODUCTS CONTAINING VOLATILE OIL ASSOCIATED WITH BITTER PRINCIPLE OR EXTRACTIVE,	133
RESINS, OLIFORESINS, GUM RESINS, AND BALSAMS.—Definition of Resins. Their Chemical Position. Description. Classes,	136
FIXED OILS, FATS, AND SOAPS.—Source, Description, and Chemical Position, .	139
UNSAAPONIFIABLE FATS AND PETROLEUM PRODUCTS,	142
DRUGS CONTAINING GLUCOSIDES OR NEUTRAL PRINCIPLES WITH THEIR PREPARATIONS.—Glucosides; Chemical Position and General Consideration, . . .	144
DRUGS CONTAINING SAPONINOID PRINCIPLES, WITH THEIR PREPARATIONS, .	147
DRUGS CONTAINING CATHARTIC PRINCIPLES, AND THEIR PREPARATIONS, . .	147
DRUGS CONTAINING ASTRINGENT PRINCIPLES, AND THEIR PREPARATIONS, . .	151
ALKALOIDS.—Amides, Amines. Source and Distinctive Features of Alkaloids. Nomenclature,	153

PRODUCTS FROM ANIMAL SUBSTANCES.

OFFICIAL PRODUCTS DERIVED FROM THE CLASS MAMMALIA,	164
OFFICIAL PRODUCTS OF THE CLASS PISCES,	166
OFFICIAL PRODUCTS OF THE CLASS AVES,	167
OFFICIAL PRODUCTS OF THE CLASS INSECTÆ,	167
TABLES FOR CONVERTING METRIC WEIGHTS AND MEASURES,	170

COMPEND OF PHARMACY.

INTRODUCTORY.

PHARMACOPŒIAS AND DISPENSATORIES.

What is a Pharmacopœia? A Pharmacopœia is an authoritative list of medicinal substances, with definitions, descriptions, or formulas for their preparation.

The necessity for authoritative standards to define the character, establish the purity, and regulate the strength of medicines, is recognized by all civilized nations. The most important of these works, with the date of their last issue now extant, are as follows: U. S. Pharmacopœia (1893);¹ British Pharmacopœia (1885);² Pharmacopœia Germanica (1890); Codex Medicamentarius (Pharmacopée Française—France (1884); P. Austriaca—Austria (1889); P. Rossica—Russia (1891); P. Suecica—Sweden (1869); P. Norvegica—Norway (1879); P. Danica—Denmark (1893); P. Belgica—Belgium (1885); P. Helvetica—Switzerland (1893); Farmacopea Español—Spain (1884); Pharmacopœia Portugueza—Portugal (1876); P. of India (1868);³ P. Hungarica—Hungary (1888); P. Neerlandica—Netherlands (1889); P. Româna—Roumania (1874); P. Fenica—Finland (1885); ΕΛΛΗΝΙΚΗ ΦΑΡΜΑΚΟΠΟΙΙΑ—Greece (1868); Nueva Farmacopea Mexicana (1884); Farmacopea ufficiale del Regno d'Italia—Italy (1892); Farmacopœa Chilena—Chili (1886); Pharmacopœia Japonica—Japan (1891).

Countries having no national Pharmacopœia adopt the standard of other countries, or supply standard pharmaceutical works for the same purposes.

The Pharmacopœias of all nations except those of the United States, Mexico, Chili and Greece are issued under the authority of the respective governments, and therefore partake of the nature of laws.

The U. S. P. was originally devised, and is decennially revised, by a committee appointed from the professions of medicine and pharmacy. It should be a representative list of the drugs and preparations employed in therapeutics.

NOMENCLATURE OF THE UNITED STATES PHARMACOPŒIA OF 1890.

How are the titles of the medicinal substances indicated in the U. S. P. of 1890? 1, by the Official Name, which is always in Latin; 2, by the English Name; 3, by the Synonym; 4, by the Botanical Name

¹ Designated as "U. S. P., 1890."

² Supplement, 1890.

³ Supplement, 1869.

(in the case of plants); 5, by the Symbolic Formula (in the case of chemicals).

Give examples of each. *Cannabis Indica* (official name). Indian Cannabis (English name). Indian Hemp (Synonym). *Zinci Iodidum* (O. N.). Iodide of Zinc (E. N.). ZnI_2 ; 318.1—*ZnI*. 159.05 (Symbolic Formula). *Prunus Virginiana* (O. N.). Wild Cherry (E. N.). The Bark of *Prunus serotina* (Botanical name).

1. The Official Name.—When is the use of the official name proper? In designating the drug when precision is required—labels, prescriptions, specimens, etc.

Why is the Latin Language employed for the official name? Because it is a dead language and is not liable to change, as in the case of a living tongue.

2. The English Name.—When should the English name be employed? In ordinary conversation, in commercial transactions, and in all cases “where the use of the Latin official name could be justly criticised as an ostentatious display of erudition.”

3. The Synonym.—When should the synonym be used? The synonym should be rarely or never used. The synonym is usually antiquated and from an unscientific source, but on account of long usage in common language synonyms cannot be completely ignored.

4. The Botanical Name.—What is meant by the botanical name? “By this is meant the systematic name recognized by botanists for plants, which serves in pharmacopoeial nomenclature as the basis of the official name.”

Capsicum fastigiatum is the botanical name for the variety of Cayenne pepper designated by the U. S. P. *Capsicum* indicates the genus, *fastigiatum* the species to which the plant belongs. Then follows the definition, which shows what part of the plant is employed, “the fruit of *Capsicum fastigiatum*.”

When should a capital letter be employed in writing the specific name? 1. When the specific name is derived from a generic name, as *Rhamnus Frangula*; 2. When derived from the name of a person, as *Strychnos Ignatii*; 3. When indeclinable, as *Erythroxylon Coca*.

The name of the author follows the botanical name, as *Capsicum fastigiatum* Blume, then the natural order to which the plant belongs, in italics, and the whole enclosed in parentheses, as (Nat. Ord., *Solanaceæ*).

When should the botanical name be employed? Its use is absolutely necessary in establishing the identity of drugs.

5. The Symbolic Formula.—What is meant by the symbolic formula? The symbolic formula is a combination of symbols representing the chemical structure of the articles to which they refer with the utmost brevity and exactness.

NaI means the same as *Sodii Iodidum* and Iodide of Sodium, but it is shorter and much more definite. $(\text{ZnCO}_3)_2 \cdot 3\text{Zn}(\text{HO})_2$ means that precipitated carbonate of zinc consists of two molecules of carbonate of zinc and three molecules of hydrate of zinc. $\text{Na}_2\text{SO}_3 \cdot 7\text{H}_2\text{O}$ means sulphite of sodium containing seven molecules of water of crystallization, and no other sulphite of sodium.

Both the new and the old chemical nomenclature are used by the U. S. P.

in expressing symbolic formulæ—the latter in italics—but the former is to be preferred.

The figures following the symbolic formulæ express the molecular weight (the sum of the weight of the atoms) of the chemical. For example, the molecular weight of $\text{Na}_2\text{SO}_3 \cdot 7\text{H}_2\text{O}$ is 252. Na weighs 23; two atoms are employed, which equals 46. S weighs 32. O weighs 16; three atoms are employed, which equals 48. H weighs 1; two atoms are employed, which equals 2. O weighs 16, which added to 2 = 18. H_2O is taken 7 times; 7 times 18 equals 126. $46 + 32 + 48 + 126 = 252$, the molecular weight of sulphite of sodium.

This matter of atoms and molecular weights can be made clear to the student by the following illustration: A pays B 100 sovereigns, English money, in sovereigns and half sovereigns, giving him 50 of the former and 100 of the latter; how much will the 100 sovereigns of gold weigh?

$$\begin{array}{rcl} 1 \text{ sovereign weighs } 124 \text{ grains} & \times & 50 = 6200 \text{ grains.} \\ \frac{1}{2} \text{ " " " } 62 \text{ " } & \times & 100 = 6200 \text{ " } \end{array}$$

Weight of 100 sovereigns in gold, 12400

In the same way the molecular weight of water (H_2O) is 18.

$$\begin{array}{rcl} \text{H, Hydrogen atom, weighs } 1 & \times & 2 = 2 \\ \text{O, Oxygen atom, " } 16 & \times & 1 = 16 \end{array}$$

Molecular weight of H_2O , 18

Official Description.—Immediately following the official definition, there will be noticed in the Pharmacopœia, in smaller types, what has been termed the official description: of what does this description usually consist? (A) In drugs—1, a concise statement of physical characteristics; 2, tests of identity; 3, description of adulterants. (B) In chemicals—1, statement of physical characteristics, as in case of drugs; 2, solubilities; 3, tests of identity and purity.

DISPENSATORIES.

What is a Dispensatory? A Dispensatory is a Commentary on a Pharmacopœia.

What do Dispensatories aim to present? The Dispensatories generally aim to present information concerning important non-official drugs and those official in other Pharmacopœias as well as those of the U. S. P.

What Dispensatories have we in the U. S.? We have in this country The United States Dispensatory, National Dispensatory, and King's Dispensatory.

PART I.

METROLOGY.

WEIGHT, MEASURE, AND SPECIFIC GRAVITY.

What is weight? Weight is the difference between the attraction of the earth and that of surrounding bodies for bodies on the surface of the earth.

Upon what does the weight of a body depend? Upon its bulk and density. Density is the amount of matter in given bulks of bodies.

What is meant by weighing? Balancing a body of known gravitating force with one whose gravity is not known, for the purpose of estimating the gravitating force of the latter, which is called its weight.

What are weights? Bodies of known gravitating force used for weighing.

What name is given to the apparatus used for weighing? Scales and weights.

What standards are used upon which to base the system of weights? The Grain and the Metre.

How was the grain weight derived? By act of Henry III of England, in 1226; "An English silver penny, called the sterling, round and without clipping, shall weigh *thirty-two grains of wheat*, well dried and gathered out of the middle of the ear."

What is a Metre? One 40 millionth of the circumference of the earth at its poles.

What systems of weights used in Pharmacy are based on the Grain? The Troy or Apothecaries' system and the Avoirdupois system.

State the denominations of each. *Troy or Apothecaries' Weight*: 20 grains = 1 scruple; 3 scruples = 1 drachm; 8 drachms = 1 ounce; 12 ounces = 1 pound. *Avoirdupois Weight*: 437½ grains = 1 ounce; 16 ounces = 1 pound.

State the Symbols of each. *Troy*: grain, or grains, gr.; scruple, ℥; drachm, ℥; ounce, ℥. *Avoirdupois*: ounce, oz.; pound, lb.

How many grains do the ounce of each system contain, respectively, and what is the difference in grains between the Troy and Avoirdupois ounce? Avoirdupois ounce = 437½ gr.; Troy ounce = 480 gr. Troy ounce 42½ grains greater.

What is the difference in grains between the Avoirdupois and Troy pound? Avoirdupois pound, 7000 grs.; Troy pound, 5760. Avoirdupois pound, 1240 grains greater.

What is Measure? The bulk or extension of bodies.

What Systems of Measure are used in Pharmacy? Apothecaries' or Wine Measure, Imperial or British Measure, and the Metric System.

State the denominations of each. *Apothecaries' Measure*: 60 minims = 1 fluidrachm; 8 fluidrachms = 1 fluidounce; 16 fluidounces = 1 pint; 8 pints = 1 gallon. *Imperial Measure*: 60 minims = 1 fluidrachm; 8 fluidrachms = 1 fluidounce; 20 fluidounces = 1 pint; 8 pints = 1 gallon.

State the Symbols of each. *Apothecaries' Measure*: Minim, m ; fluidrachm, $\text{f}\overline{\text{z}}$; fluidounce, $\text{f}\overline{\text{z}}$; pint, O ; gallon, Cong. *Imperial Measure*: Minim, min. ; fluidrachm, fl. dr. ; fluidounce, fl. oz. ; pint, O ; gallon, C.

State the relations of Apothecaries' and Imperial Measures to Troy and Avoirdupois Weights. *Apothecaries' Measure*: The pint of distilled water at 15.6°C. (60°F.) weighs 7291.2 grs.; the fluidounce, 455.7 grs.; the gallon, 8.3328 pounds avoirdupois. *Imperial Measure*: pint weighs 8750 grs.; fluidounce, 437.5 (which is the same as the avoirdupois ounce, and 18.2 grs. less than that of the U. S. fluidounce of water at the same temperature); gallon, 10 pounds avoirdupois.

What is a Metre? The unit of length of the Metric, French, or Decimal system, from which all other denominations are derived.

How was it obtained? It was obtained by a measurement of the quadrant of a meridian of the earth, and is about $\frac{1}{40000000}$ of the circumference of the earth at the poles.

What is it practically? Practically, it is the length of certain carefully preserved bars of metal from which copies have been taken.

What is its equivalent in feet and inches? It is equal to about 3 ft. 3. in. and $\frac{3}{8}$ in.

What is the unit of surface, and how derived? The unit of surface is the Are, which is the square of ten metres (the square of a decametre) = a square whose side is 11 yards.

What is the unit of capacity, and how derived? The *Litre*, which is a cube of a tenth of a metre (the cube of a decimetre) = 2.1134 pints.

What is the unit of weight, and how obtained? The unit of weight is the *Gramme*, which is the weight of that quantity of distilled water, at its maximum density (4°C.) which fills the cube of the one-hundredth part of the metre (cube of a centimetre, or, in other words, cubic centimetre, c.c.), = 15.43235 grains, or about $15\frac{1}{2}$ grains.

How are the denominations of the Metric System multiplied and divided? They are multiplied by the Greek words, "Deca," Ten; "Hecto," Hundred; "Kilo," Thousand; and divided by the Latin words, "Deci," one-tenth; "Centi," one-hundredth; "Milli," one-thousandth.

TABLE SHOWING HOW METRIC UNITS ARE MULTIPLIED AND DIVIDED.

Quantities.	Length.	Surface.	Capacity.	Weight.
1000	Kilo-metre.	. . . .	Kilo-litre.	Kilo-gramme.
100	Hecto-metre.	Hectare.	Hecto-litre.	Hecto-gramme.
10	Deca-metre.	. . . .	Deca-litre.	Deca-gramme.
1 (Units.)	METRE.	ARE.	LITRE.	GRAMME.
.1	Deci-metre.	. . . .	Deci-litre.	Deci-gramme.
.01	Centi-metre.	Centare.	Centi-litre.	Centi-gramme.
.001	Milli-metre.	. . . .	Milli-litre.	Milli-gramme.
				—(Atfield.)

Describe the use of the Gramme and Cubic Centimetre (fluid-gramme as units of weight and measure. In the practical working of a laboratory, the Gramme and its divisions are used for weighing, and the cubic centimetre (c.c. or fluigramme) for measuring liquids. A gramme and

a cubic centimetre of distilled water are identical, but owing to greater or less density, cubic centimetres of other liquids weigh more or less than a gramme. But if the c.c. is taken as a unit of capacity only, and the gramme as the unit of weight, all difficulty is avoided. For example, dissolve 1 gramme of sugar in sufficient quantity of water to make 10 c.c. It is evident that each c.c. of this solution contains 1 deci-gramme of sugar. By keeping the c.c. intact and varying the strength of the solution, each c.c. can be made to contain any stated amount of sugar from saturation to infinity.

TABLE OF EQUIVALENTS.

One Cubic Centimetre	= 16.23 Minims.
Four " "	= 1.08 Fluidrachms.
Thirty " "	= 1.01 Fluidounces.
One Minim	= 0.06 c.c.
Four " "	= .25 "
Ten " "	= .62 "
One Troy drachm	= 3.888 Grammes.
One Troy ounce	= 31.103 "
One Avoirdupois ounce	= 28.35 "

Explain the signification of the Micromillimetre and the Kilo. Micromillimetre (Mkm) is a term used in microscopy, and signifies the one-thousandth part of a millimetre. Kilo is merely an abbreviation of the word kilogramme, and is used for convenience and brevity.

How would you convert metric weights or measures into those in ordinary use? Multiply the metric quantities by the corresponding equivalent. Ex. To convert—

Metres into inches,	multiply by	39.370
Litres into fluidounces,	" "	33.815
Cubic Centimetres into fluidounces,	" "	0.0338
" " " Imperial fluidounces " "	" "	0.0352
Grammes into grains,	" "	15.432
Decigrammes into grains,	" "	1.5432
Centigrammes " "	" "	.15432
Milligrammes " "	" "	.015432

How would you convert the weights and measures in ordinary use into metric weights and measures? Multiply the quantities by the corresponding metric equivalent. Ex. To convert—

Inches into metres,	multiply by	0.0254
Fluidounces into cubic centimetres, " "	" "	29.572
Grains into grammes,	" "	0.0648
Avoid. ounces into grammes,	" "	28.3495
Troy " " " "	" "	31.1035

What is a Balance? An instrument for determining the relative weight of substances.

How many kinds of Balances are there? Five: 1. Single beam, equal arm. 2. Single beam, unequal arm. 3. Double beam, unequal arm. 4. Compound lever balances. 5. Torsion balances.

Describe the construction, requirements, and tests of each. 1.

SINGLE BEAM, Equal Arm.—*Construction.*—A beam is suspended on a knife edge, which divides it into equal arms; end knife edges are placed at each end of the beam, on the same plane and at equal distances from the point of suspension, for supporting the pans which carry the substances to be weighed.

Requirements.—1. "When the beam is in a horizontal position, the centre of gravity should be slightly below the point of suspension, or central knife edge, and perpendicular to it." (Remington.) 2. "The end knife-edges must be exactly equal distances from the central knife-edge; they must all be in the same plane, and the edges absolutely parallel to each other." (Remington.) 3. "The beam should be inflexible, but as light in weight as possible, and the knife-edges in fine balances should bear upon the agate planes." (Remington.)

Test.—1. Sensibility with unloaded pans: 1. Place the balance in position on a perfectly level counter or table; elevate the beam so that it is free to oscillate; when the balance comes to rest, place the smallest weight to which it is sensitive upon the right-hand pan, to which the balance should immediately respond. 2. Sensibility with loaded pans: Place the full weight the balance is designed to carry on the pans, then on one pan place the smallest weight, as before. The balance should respond in a decided manner. 3. Equality of arms: Load the pans to half their capacity, perfecting the equilibrium, if necessary, with a piece of tin foil. Now reverse the weights, and if the equilibrium is still maintained, the arms of the beam are equal. 4. Parallelism in knife-edges: Moderately load and balance the pans. Now shift one of the larger weights in different positions on the edge of the pan, carefully noting any variation in equilibrium, if such occur. This variation indicates a want of parallelism in the knife-edges.

2. **SINGLE BEAM, Unequal Arm.**—*Construction.*—This can be seen by inspecting the well known Fairbanks scales. It depends on the principle in physics, "*The power is to the weight or resistance in the inverse ratio of the arms of the lever.*" The longer arm of the beam is graduated for a movable weight, the use of which dispenses with small weights, which is a decided advantage.

3. **DOUBLE BEAM, Unequal Arm.**—*Construction.*—Same as the above, but with two parallel beams. Employed for weighing liquids, etc., the outside beam being used to tare the bottle or jar.

4. **COMPOUND LEVER BALANCES.**—Well shown in Fairbanks' platform scales, used for druggists' counters and sometimes for prescription scales. Trömmner has an excellent scale for weighing liquids on this principle.

5. **TORSION BALANCES.**—A compound beam is balanced and supported upon an immovable centre frame, upon which a flattened gold wire is stretched with powerful tension; the beam is prevented from slipping out of place, and the torsion is secured, by the gold wire being firmly fastened to the under side of the beam; upon the ends of the beam are fastened the movable frames which support the pans. There is a simple method of arresting the motion by moving the lever, and the delicacy of the balance is increased by placing a weight upon the index, whereby the centre of gravity is elevated. *Knife-edges are done away with entirely.*

How may Balances be protected? By enclosing them in glass cases with convenient sliding doors.

How are liquids measured? In graduated vessels; vessels of tinned copper, tinned iron, and enameled sheet iron, called agate, are usually employed for quantities larger than one pint; but glass measures are preferable for quantities of one pint or less. The former are generally made larger at the bottom than the top; the latter are either conical, with apex at the bottom, or cylindrical, and graduated on the sides. It is better that the marking be on both sides of the graduate.

How would you test a glass graduate? Place it upon a perfectly level surface, then pour into it 455.7 grains distilled water at 15.6° C. (60° F.). This should measure one fluidounce; or, measure into the graduate 30 c.c. of water (29.57 c.c.) for a fluidounce.

What is a graduated Pipette? A glass tube graduated on the side, with a constricted point. It is used by applying suction to the upper end, and holding the liquid in the tube by applying the finger to the upper end while reading off the contents.

What is a Meniscus, and for what is it used? Owing to capillary attraction, the top of the liquid in a graduated pipette presents a cup shape. This is called a *meniscus*. A line drawn through the bottom of the *meniscus* is usually selected as the reading point.

What is the size of a drop? Erroneously, a drop is supposed to be a minim; but though this may be approximately true when applied to water, it is not true in regard to any other liquid. Thick, viscous liquids produce large drops; heavy, mobile liquids small ones. A drop of syrup of acacia is five times as large as a drop of chloroform. The shape and surface from which the drop is poured also influences its size.

SPECIFIC GRAVITY.

What is Specific Gravity? The comparative weight of bodies of equal bulk. It is ascertained by weighing the bodies with an equal bulk of pure water at a given temperature and atmospheric pressure, which is taken as one.

How would you obtain the Specific Gravity of a body? To obtain the specific gravity of a body, it is only necessary to balance it with an equal bulk of the standard, and ascertain how many times the weight of the standard is contained in its weight. Ex. A fluidounce of water (standard) weighs 455.7 grains; a fluidounce of lime-water weighs 456.3 grains; $456.3 \div 455.7 = 1.0015$, that is, the lime-water weighs 1.0015 times more than water, bulk for bulk. In other words, its specific gravity is 1.0015. A fluidounce of alcohol weighs 422.8; $422.8 \div 455.7 = 0.928$, specific gravity.

What general rule may be given for finding Specific Gravity? Divide the weight of the body by the weight of an equal bulk of water; the quotient will be the specific gravity.

What method is usually adopted to ascertain the weight of the equal bulk of water in taking the Specific Gravity of solids? A solid body immersed in water will displace its own bulk; it is required to find out the weight of this equal bulk of water. This might be ascertained by immersing the body in a vessel of water already full, then saving and weighing the displaced water which runs over. But there is a better way

of finding out. Archimedes filled his bath-tub too full of water, one day, and it overflowed when he got into it. This led him to experiment, and he found that when weighed in water he lost as much weight as the water he displaced weighed. It is only necessary, then, to weigh a body first in air, then in water, and note its loss of weight when weighed in the latter medium. This loss is evidently the weight of an equal bulk of water. By our rule, we divide the weight of the body by the weight of an equal bulk of water; and it follows that it is the same thing to say: divide the weight of the body by its loss of weight in water, for that loss is the weight of an equal bulk of water. The quotient will be the specific gravity.

How would you take the Specific Gravity of a body heavier than water? Four methods are used. *1st method:* Accurately weigh the substance and note the weight. Now suspend the body from the hook at the end of the scale-beam with a horse-hair, so it shall hang a little above the scale-pan; next, place a small wooden bench in such a manner that it shall straddle the scale-pan, but not touch it; place a small beaker on the bench, partly filled with water, in which submerge the suspended body, noting the loss of weight by the use of proper weights on the opposite scale-pan; after which apply the rule already given. Ex. Weight of a piece of copper in the air, 805.5 grains; weight in water, 715.5 grains: loss of weight, 90 grains. $805.5 \div 90 = 8.95$, sp. gr. *2d. method:* With the specific gravity bottle. Add 1000 to the weight of the substance in the air. Now drop it into a 1000-grain specific gravity bottle, fill the bottle with water and weigh again. Subtract the 2d sum from the 1st sum, and the difference is the loss of weight in water. Now apply the rule. Ex. A piece of aluminum wire weighs 100 grains in the air. $100 + 1000 = 1100$. Dropped in a 1000-grain specific gravity bottle, and the bottle filled with water, the weight of both is 1062. Then $1100 - 1062 = 38$ grains, the loss of weight in water. $100 \div 38 = 2.63$, specific gravity. *3d method:* With the graduated tube. Drop the substance into a tube graduated so that each space shall indicate a grain or gramme of water, and note how much higher the liquid rises in the tube, which is the weight of an equal bulk of the substance. This known, apply the rule. *4th method:* By immersing the solid in a transparent liquid of the same density. Drop the solid in a liquid of sufficient density to float it, then reduce its density with water until the solid neither rises nor sinks, but swims indifferently. The specific gravity of the liquid and solid will now be the same. Take out the solid and find the specific gravity of the liquid with the specific gravity bottle.

How would you proceed if the solid were soluble in water? Use oil or some other liquid in which the solid is not soluble, as though it were water, then, by the following proportion, find the loss of weight in water: as the specific gravity of oil is to the specific gravity of water, so is the loss of weight in oil to the loss of weight in water. Then apply the rule.

How would you take the Specific Gravity of a solid lighter than water? Force the substance under water by attaching a heavier body to it. First weigh both in the air, then both in water, and the difference will be the loss of both in water. A simple subtraction will give the loss of weight of one. Then apply the rule.

With what apparatus would you take the Specific Gravity of a liquid? A specific gravity bottle, hydrometer, or specific gravity beads.

How would you construct a Specific Gravity bottle? A bottle with a long, slim neck is counterpoised by an appropriate weight, and distilled water at the appropriate temperature, 15° C. (60° F.), poured in until it contains 1000 grains. The height reached by the water in the neck is then scratched thereon with a file, and it is ready for use.

What are Specific Gravity beads? Little pear-shaped, hollow globes of glass, loaded at the apex, and arranged to float indifferently in liquids of the specific gravity for which they are gauged, but to sink or swim in liquids that are lighter or heavier than they are.

Give directions for using the Specific Gravity bottle for taking the Specific Gravity of Liquids. Counterpoise the bottle and fill it to the mark with the liquid to be examined. The number of grains the liquid weighs, properly pointed off decimally, is its specific gravity. A 1000-gr. specific gravity bottle will hold 1160 grains of hydrochloric acid. Point off decimally 1.160, which is the specific gravity of hydrochloric acid. A 1000-gr. specific gravity bottle will hold 750 grains of ether. Point off decimally 0.750, thus showing the relation to the specific gravity of water, 1.

If a bottle of any size is substituted for the 1000-gr. bottle, what equation will give the specific gravity? As the number of grains of water the bottle holds is to 1000 (the specific gravity of water), so is the number of grains of liquid it holds, to the specific gravity of the liquid.

Describe the Hydrometer. As now constructed, the hydrometer usually "consists of a glass tube loaded at the bottom with mercury or small shot, having a bulb blown in it just above the loaded end." The principle of its action depends upon the fact that a solid body floating in a liquid displaces a volume of liquid exactly equal to its own weight.

Into what two general classes may Hydrometers be divided? 1st, those for liquids heavier than water; 2d, those for liquids lighter than water. The first class are called by the French *Pèse-Acide*, or *Pèse-Sirap*, and the second class *Pèse-Esprit*.

What other class of Hydrometers is in use? Those intended to sink, by the addition of weights, to a given mark on the stem, and thus displace a constant volume.

What is a Baumé Hydrometer? The instrument devised by Baumé is peculiar only in so far as its system of graduation is concerned. This was made in the following manner: 1st, for liquids heavier than water, the instrument was loaded with sufficient mercury to sink it in water to a convenient point near the top, which was marked 0. It was then placed in a 15 per cent. salt solution, and the point at which it rested marked 15; the interspace between 0 and 15 was now marked off into 15 equal spaces, and the scale below extended by marking off similar spaces. 2d, for liquids lighter than water, a 10 per cent. salt solution was used, and the instrument loaded to sink into it to a point just above the bulb, which was marked 0. It was then allowed to sink in water, and the point of rest marked 10. The interspace between 0 and 10 was now divided into 10 equal spaces, and the scale above extended by marking off equal spaces.

What is the objection to Baumé's Hydrometer? The graduations

are entirely arbitrary, necessitating computation to determine the corresponding specific gravity.

What Hydrometer is rapidly taking its place? The Specific Gravity Hydrometer; the graduations upon the stem indicating at once the specific gravity.

Urinometer, saccharometer, eleometer (for fixed oils), and alcoholmeter, and hydrometers for the special purposes indicated by their names.

HEAT.

What is heat? Heat is molecular motion.

What is a Furnace? A species of stove for generating heat.

What are the elements of a furnace? The *air-flue, combustion-chamber, and vent or chimney*.

What proportion should they bear to each other? The special object sought in constructing the furnace must determine the proportions these shall bear to each other.

What is the best fuel for generating heat? Anthracite Coal.

How much air is required to burn one pound of coal? Theoretically, 150 cubic feet; practically, twice that.

What liquids are used for fuel in pharmacy, and on what does their heating power depend? Alcohol, petroleum or coal oil, and benzine or gasoline. They all contain C and H (alcohol, 34 per cent. O in addition), on which their heating depends.*

What is Illuminating Gas? A mixture of carburetted hydrogen (CH_4), which is its principal constituent, with considerable hydrocarbons, hydrogen, carbon dioxide and monoxide, aqueous vapors, and traces of oxygen and nitrogen.

How may it be fitted for heating purposes? By mixing it with air. This is done by admitting air below the flame, using special apparatus for this purpose.

Describe a Bunsen Burner. A brass tube, four inches high, with four large circular holes near the base, to admit the air, which may be regulated by a perforated brass ring which surrounds the tube, is supported by a metal pedestal, and connected with a gas fixture by a tube. The coal-gas admitted mixes with the air, and burns at the top of the tube with an intensely hot, colorless flame.

How would you measure heat? By the thermometer.

Describe a Thermometer. A thermometer consists of a glass tube with capillary bore sealed at one end, and the other end terminating in a bulb. The bulb is filled with mercury or other fluid, which, being expanded by heat, rises in the tube and indicates the degree of heat, either on an index scratched on the tube itself, or marked on a piece of paper against which the tube is placed.

Describe the three scales for marking thermometric degrees now in use. The scales are, 1. Centigrade; 2. Fahrenheit, and 3. Réaumur. In the Centigrade scale, the freezing point of water is zero, the boiling

* For special apparatus for developing heat for pharmaceutical manipulations, see Remington's "Practice of Pharmacy."

point 100°, and the intervening space is divided into 100 equal parts called degrees. In the Fahrenheit scale, the freezing point of water is 32°, the boiling point 212. and the intervening space is divided into 180 equal parts called degrees. In the Réaumur scale, the freezing point is zero, and the boiling point 80.

What ratio do the three scales bear to each other, and how would you convert the scale of one into the other? Ratio: 5 : 9 : 4.

FORMULÆ FOR THE CONVERSION OF DEGREES OF ONE THERMOMETRIC SCALE INTO THOSE OF ANOTHER.—*Attfeld.*

F. = Fahrenheit. C. = Centigrade. R. = Réaumur. D. = Observed Degree.

If above the freezing point of water (32°

F. : 0° C. ; 0° R.),

F. into C., (D - 32) ÷ 9 × 5

F. " R., (D - 32) ÷ 9 × 5

C. " F., D ÷ 5 × 9 + 32

R. " F., D ÷ 4 × 9 + 32

If below freezing, but above 0° F. (- 17.77

C. ; - 14.22° R.),

F. into C., (32 - D) ÷ 9 × 5

F. " R., (32 - D) ÷ 9 × 4

C. " F., 32 - (D ÷ 5 × 9)

R. " F., 33 - (D ÷ 4 × 9)

If below 0° F. (- 17.77° C. - 14.22° R.),

F. into C., (D + 32) ÷ 9 × 5

F. " R., (D + 32) ÷ 9 × 4

C. " F., (D ÷ 5 × 9) - 32

R. " F., (D ÷ 4 × 9) - 32

For all degrees,

C. into R., D ÷ 5 × 4

R. " C., D ÷ 4 × 5

RULES.

1. To convert Centigrade degrees into those of Fahrenheit above 32, multiply by 1.8 and add 32.

2. To convert Fahrenheit degrees above 32 into those of Centigrade, subtract 32 and divide by 1.8.—*Remington.*

How would you select a thermometer? Choose one made of glass, thick enough to be strong, but thin enough to be delicate, with graduations marked on tube, which should be of equal diameter throughout, with flat or elliptical, perfectly uniform bore. It should be free from air, which may be tested by inverting the instrument and seeing that the mercury descends to the lowest part of the tube.

What is a blow-pipe, and how is it used? A slightly conical, gradually tapering metallic or glass tube, curved at the smaller end, and having a minute orifice at that end for producing a blast. When used, an unremitting current of air is forced through the tube from the mouth, by keeping the cheeks distended with air and constantly supplying fresh air from the lungs, as needed.

Describe the nature of the blow-pipe blast. 1st. It has an intense heat. 2d. When used with a luminous flame, the interior of the blow-pipe blast, owing to the carbon not being wholly oxidized, has the power of reducing oxides. It is, therefore, called the *reducing* flame. The outer part of the blast has the opposite or oxidizing property, and is called the *oxidizing* flame.

What is the blow-pipe used for in Pharmacy? Used for bending and working glass, testing fusible chemical substances, in soldering, etc.

What is a Crucible, and for what is it used? A crucible is a cup-shaped vessel, intended to withstand a powerful heat. Clay, plumbago, porcelain, iron, silver, and platinum, are some of the materials employed for crucibles. Platinum ranks first, plumbago second, the Hessian crucible

next, though quite inferior; then comes the more fragile porcelain and wedgewood crucibles, which must be gradually cooled, to prevent breakage.

What eight processes in Pharmacy require the application of high heat? 1. *Ignition*. 2. *Fusion*. 3. *Calcination*. 4. *Deflagration*. 5. *Carbonization*. 6. *Torrification*. 7. *Incineration*. 8. *Sublimation*.

Describe each of these processes. 1. *Ignition* consists in strongly heating solid or semi-solid substances to obtain a definite residue. Ex. The official quantitative tests for purified sulphide of antimony, phosphoric acid, etc.

2. *Fusion* is the process of liquefying solid bodies by heat. Ex. Melting of iron or lead, or of wax.

3. *Calcination* is the process of driving off volatile substances, such as gas or water, from inorganic matter, by heat without fusion. Ex. Magnesia, lime, etc., prepared by calcination.

4. *Deflagration* is the process of heating one inorganic substance with another capable of yielding oxygen (usually a nitrate or a chlorate); decomposition ensues, accompanied by a violent, noisy, or sudden combustion. Ex. Salts of As and Sb made by this process.

5. *Carbonization* is the process of heating organic substances *without* the access of air, until they are *charred*. The volatile products are driven off, but combustion is prevented. Ex. Charcoal is made in this way.

6. *Torrification* is the process of roasting organic substances. The constituents are modified but not charred. Ex. The roasting of coffee. *Torrefied Rhubarb* is obtained in this way. It loses its cathartic properties by this process, but retains its properties as an astringent.

7. *Incineration* means the burning of organic substances to ashes in air. The ashes is the part sought. Ex. Determining the amount of fixed matter in organic substances by burning them and examining the ashes.

8. *Sublimation* is the process of distilling solid volatile substances from non-volatile substances. Ex. Camphor is separated from strips of wood from the camphor tree in this way.

What various forms of apparatus are used to modify and control heat? The water-bath, salt-water bath, sand bath, oil-bath, glycerine-bath, etc.

Limit the range of the several forms of bath. The water-bath can only be used for temperatures below 100°C . (212°F). Saturated salt solution boils at 108.4°C . (227.1°F), which degree limits the range of the salt-water bath. Glycerin may be heated to 250°C . (480°F) without much inconvenience from the Acrolein, which is produced when that substance is raised nearly to the boiling point. The oil-bath is designed to furnish a regulated temperature below 260°C . (500°F), and the sand-bath may be used at any temperature.

Upon what theory is Steam used in pharmaceutical operations? Matter exists in three forms: *solid*, *liquid*, and *gaseous*, depending upon the degree of distance between its molecules. Heat is but another name for molecular motion (possibly atomic motion also). Increase molecular motion, and molecular distance is increased to give room between the molecules for that motion. Cohesion holds molecules together. Heat, therefore, works against cohesion. If water is heated until its molecules are driven far apart, it becomes steam (water-gas), and its molecules are now

in very rapid vibration. If brought into contact with a cool surface, that is, a surface of slower molecular vibration, it imparts its motion to that surface, and the steam is condensed—its motion is lost, and it returns to the condition of fluid again. But by imparting its heat (motion) to the surface with which it came in contact, this surface becomes heated. The molecular motion of the surface becomes as great as the steam when equilibrium is attained and the temperature of the surface remains constant. As hot steam can be transported long distances by appropriate pipes, it becomes a convenient means of heating surfaces at a distance from the fire, and the steam being under perfect control, the temperature may be regulated with great exactness.

In what two forms is steam used for heating? Steam without pressure, and steam under pressure, or superheated steam.

What advantage has the latter? Steam under pressure is hotter because more heat is required to raise water to the condition of a gas against increased pressure.

In what way may steam under pressure be used for evaporation? By means of jacketed kettles.*

How may the heat be increased in such kettles? By combining the kettle with a steam coil.

For what other purposes are steam coils used? For heating apartments, drying ovens, evaporating dishes placed upon them, and for boiling water, by placing a steam coil in the water.

OPERATIONS REQUIRING HEAT.

What is Vaporization? The operation of increasing molecular motion by heat until matter assumes the form of vapor or gas.

Explain what is meant by the various terms, Evaporation, Distillation, Desiccation, Exsiccation, Granulation, Sublimation. In the vaporization of liquids, when the object sought is the fixed part, the process is called *evaporation*, when it is the volatile part that is sought, it is called *distillation*. If solids are vaporized, when the fixed part is sought, the process is called *Desiccation*, *Exsiccation*, and when furnished in a granular condition, *Granulation*; but if the volatile part is sought, it is called *Sublimation*.

What is Ebullition, or Boiling? A violent agitation in a liquid produced when it is heated from the fluid to the gaseous condition. The heat acts first on that portion of liquid resting against the heated surface, converting a portion into steam, which rises in the form of bubbles, which break on the surface of the liquid.

What is meant by the boiling point of a liquid? The temperature at which it boils. Each liquid has its specific boiling point as well as its specific weight. Liquids evaporate more or less at all temperatures, hence there seems to be no specific *evaporating* points, but there is a specific point where ebullition commences.

What is meant by the tension of matter? The molecules of which matter is composed repel each other, but are held together by cohesion

* For various forms of jacketed kettles, boilers, etc., for using steam in pharmaceutical operations, see Remington's "Pharmacy."

and atmospheric pressure. Matter is, therefore, said to exist in a state of tension. The repelling force may be heat; at any rate, by increasing heat, or molecular motion, the repelling force is increased. Heat, therefore, is a force working against cohesion and atmospheric pressure, to separate molecules apart.

How may advantage be taken of the knowledge of tension to increase the rapidity of evaporation? By removing the pressure of the atmosphere from a liquid and increasing its molecular motion, viz.: heating it, evaporation is hastened.

What important factor plays a part in the evaporation of a liquid in the open air? The degree of moisture already in the air.

In evaporating liquids at the boiling point, temperature, pressure, etc., being equal, what determines the rapidity of the evaporation? The amount of surface exposed to the heat.

What determines the rapidity of evaporation under like circumstances below the boiling point? The amount of surface exposed to the air.

How would you apply this knowledge? By selecting suitable vessels for evaporation, and employing various devices to increase the heating surface, or the surface exposed to the air, depending upon the method of evaporation chosen.

What is a Vacuum Pan? A covered evaporating pan, with an air pump, condenser, etc., for removing the pressure of the atmosphere while conducting the process of evaporation.

What is an evaporating chamber? A species of "fume-closet," built into a chimney breast, provided with gas-burners, etc., for conducting evaporation.

How would you protect a vessel from unequal heating by the flame when evaporating by direct heat? By a piece of wire gauze between it and the flame.

How would you evaporate a liquid to a fixed weight? Use a tared dish, and weigh both dish and contents when required.

How would you evaporate to a fixed volume? Use a graduated evaporating dish, and evaporate to the required volume.

How would you mark the evaporating dish to determine the required volume? Dishes may be bought already graduated, or graduated in the laboratory, either by marking the dish on the inside or pasting a strip of paper to the inside, marked with the required measure. A strip of wood placed across the top of the dish, perforated in the middle for a glass thermometer, can be used for graduating purposes, by tying a string on the thermometer to indicate the desired level.

What is a Hood? A contrivance connected with a chimney to place over evaporating dishes, etc., to conduct away vapors.

What is a Grommet? A circular bit of rubber hose upon which a round bottomed dish may be placed to keep it from turning over.

What is meant by Spontaneous Evaporation? The evaporation of a liquid at the ordinary temperature of the atmosphere.

What is Distillation? The operation of separating one liquid from another, or a liquid from a solid, by *vaporization* and *condensation*, the volatile part being the object sought.

About how much water is required to condense steam at 100° C. (212° F.)? About twenty five times its weight of water, at 20° C. (68° F.).

Describe the two typical forms of apparatus used in distillation. 1st. The *alembic* consists of a *head* or *dome*, in which the vapors generated in the *body* or *cucurbit* are condensed and run into a gutter at the base of the dome, and are carried off by a pipe. The use of the alembic in its original form is nearly obsolete. 2d. The retort consists of a long-necked flask, with the neck bent at right angles with the body of the flask. When the flask has a *tubulure*, or orifice at the top of the body, for the purpose of introducing the liquid to be distilled, it is called a *tubulated* retort. Other materials, besides glass, are used for making retorts.

How would you select a retort? For very volatile liquids a deep retort is preferable. The bottom of the neck should form an acute angle with the body. The tubulure should be situated well back, to admit a funnel without striking the bottom of the neck. The neck should taper gradually, permitting the use of a rubber ring, to form a tight joint between it and the condenser, the ring being made tight by forcing it up the gradually tapering neck. The glass should neither be too thick nor too thin, well annealed, and free from scratches, bubbles, and imperfections.

How would you improvise an ordinary flask for distillation? Select a flat-bottomed flask, with a wide mouth, to admit a large-sized rubber stopper containing a wide, bent tube, to act as a neck, a thermometer, and a safety or changing tube. The joints are made tight by *luting* them.

What is a Lute? Various pastes, which harden when dry, and serve to make joints vapor-proof, are called lutes. Flaxseed meal poured into boiling water and stirred into a paste is generally used.

How may glass tubes be connected with each other? By rubber tubing, or pieces of bladder moistened and wrapped around the proposed joint, and tying with strong linen twine.

What are Receivers? Glass vessels, usually globular in shape, for receiving distillates. Three kinds are used; plain, *tubulated*, and *quilled*. The tubulure is to prevent explosions, and the quill to allow the distillate to escape, for the purpose of measuring it as it condenses.

What are Adapters? Tapering tubes of glass, used to connect retorts with receivers.

How would you charge a retort? A plain retort should be charged with a long-beaked funnel, reaching well down into the body of the retort. Place a funnel in the tubulure, to charge a tubulated retort.

How are retorts supported? By retort stands, of which there are several patterns.

What is meant by bumping, and how may it be prevented? Certain explosions occurring in a liquid when it is boiled. It may be prevented by placing some pieces of broken glass in the retort.

What is a Liebig's Condenser? Two long tubes, the smaller inside the larger, and sufficient space between them to allow the free circulation of water, are kept in place by rubber rings between them at each end of the apparatus. The inside tube is longer, to allow it to be connected at one end with a retort, and the other end with a receiver. The apparatus is inclined at an angle on a stand, and, when in use, cold water is circulated

between the tubes, entering at an orifice situated at the lower end, and escaping at a similar orifice situated at the top, thus condensing the vapors passing through the inner tube.

What is a Still? Various forms of apparatus embracing the principles of the alembic and retort, either singly or combined, used for distillation, are called stills. When the neck of the retort is prolonged into a coil and immersed in water to condense the vapors, it is called a *worm*.

What is Sublimation? The process of distilling volatile solids. The product is called a *sublimate*.

Describe the product: 1st. *Cake sublimate*; 2d. *Powder sublimate*. When the volatile product condenses at a temperature but slightly lower than the condensing point, the deposit is made slowly and a large cake of crystals is produced. But if the vapor is condensed rapidly in a cold temperature, a powder results. Retorts and hoods of various patterns are used for sublimation, or the vapor may be condensed in chambers specially arranged for the purpose.

What is meant by Desiccation? The operation of drying medicinal substances.

What are the three objects for drying medicinal substances?
1. To aid in preserving them. 2. To reduce their bulk. 3. To facilitate their comminution. The operation is effected by various forms of ovens and drying closets, described in works on pharmacy.

OPERATIONS NOT REQUIRING HEAT.

What is meant by Comminution? The process of tearing drugs to pieces or reducing them to powder.

Name some of the processes for comminuting drugs. Cutting, rasping, grating, chopping, contusing, rolling, stamping, grinding, powdering, triturating, levigating, elutriating, granulating, etc.

What instruments may be used for cutting, slicing, or chopping? Preparing knife, pruning-shears, tobacco-knife, or herb-cutter.

What instrument for grating? Half-round rasp.

What for contusion? Iron pestle and mortar, or the pestle and mortar may be made of wood or marble.

What is meant by the terms Grinding and Pulverizing? Grinding means reducing substances to *coarse* particles. Pulverizing means reduction to *fine* particles.

What is a Drug Mill? A mill for comminuting drugs.

Into what four general divisions are drug mills divided? Burr-stone-mills, roller-mills, chaser-mills, and hand-mills.

Describe the principle of each. A burr-stone mill consists of two disks of stone, rubbing together, the approximating faces being cut in grooves, to afford grinding surfaces.

Roller mills consist of rollers revolving in opposite directions, the distances between them being regulated by screws. They operate by crushing, or cutting and crushing, and the rollers are made smooth, or with corrugations, serrations, undulations, or crenations, according the nature of the drug which is to be operated on.

Chaser-mills consist of two heavy granite stones revolving on a circular

granite base, surrounded by an iron curb. They operate by crushing and by the friction engendered by the outer edge of the stone traveling through a longer distance than the inner edge.

Hand-mills are divided into three classes, according to the arrangement of their grinding surfaces, which may be *vertical*, *horizontal*, or *conical*. They are made of iron, with grinding plates of hardened iron or steel, and thumb screws to regulate the distance between the grinding faces.

What is meant by Trituration? Rubbing substances to fine particles by means of a pestle and mortar.

Describe the process. Give the pestle a circular motion with downward pressure. Commencing in the centre of the mortar, work outward in ever increasing circles till the side of the mortar is touched, then reverse the motion and decrease the size of the circles till the centre is reached.

How should a pestle fit its mortar? See that the pestle has as much bearing on the interior surface of the mortar as its size will permit, to secure as much trituration surface as possible.

Of what substances are pestles and mortars for trituration composed? Wedgewood, porcelain, and glass.

What is a Spatula? A flexible steel blade fixed in a handle, and used for various purposes in pharmacy. "In trituration they serve to loosen up the substance when it becomes packed upon the sides of the mortar." The best form of spatula is that known as the balance handle.

How may the fineness of powders be regulated? By sieves of various construction, with meshes of different sizes, as required. It is important that all portions of the sifted powder be thoroughly mixed, in order to secure uniform composition.

Powders are known as *very fine* (sieve with 80 meshes to the linear inch); *fine* (60 m. to l. i.); *moderately fine* (50 m. to l. i.); *moderately coarse* (40 m. to l. i.); *coarse* (20 m. to l. i.). These powders are also known by number, as Nos. 80, 60, 50, 40, and 20, respectively. Iron wire, brass wire, bolting cloth, and horse hair are the materials usually chosen for sieves.

What is Levigation? "The process of reducing substances to a state of minute division by trituration after they have been made into paste with water or other liquid." A slab and muller is the apparatus used for this process. When this is constructed of porphyry, the process is termed porphyzation.

What is Elutriation? If an insoluble powder be suspended in water, the heavier particles will precipitate first. By decantation of the liquid, the finer portions may be separated. Prepared chalk is a familiar example. The process of making the pasty mass obtained by elutriation into little cones is called Trochiscation. A tinned iron cone, with a handle, is used for this purpose. The handle has a short leg in the center, which is tapped gently on a slab, upon which the substance forced through the aperture at the bottom of the cone by the shock falls, in the form of a little conical mass. Successive shocks are employed, and the resulting conical masses deposited in this manner on the slab soon dry, the moisture being absorbed by the slab.

What is meant by Pulverization by Intervention? The process of reducing substances to powder through the use of a foreign substance,

from which the powder is subsequently freed by some simple method. Ex. Camphor may be powdered with the aid of a few drops of alcohol. The foreign substance is freed from the powder by subsequent evaporation.

SOLUTION.

What is Solution? The permanent and complete incorporation of a solid or gaseous substance with a liquid. The product is called a *solution*, the liquid used a solvent, and if the solvent will dissolve no more of the substance, the product is called a *saturated solution*.

What is the difference between simple and chemical solution? In simple solution no change occurs in the chemical structure of the dissolved substance (sugar in water); but in chemical solution the reverse is the case. Ex. The officinal solution of nitrate of mercury.

How may solution of solids be facilitated? By pulverizing the substance the extent of surface exposed to the solvent is increased, and by agitation the frequency of the contact is augmented, thus favoring the rapidity of solution. Heat, by causing convection currents in the liquid, facilitates solution, and as heat works against cohesion, it increases the solubility of the substance.

May saturated solutions be used as solvents? Yes; a liquid saturated with one substance is still a solvent for another substance.

What effect has solution upon temperature? Simple solution lowers temperature; chemical solution raises temperature.

What is the best manner of effecting the solution of a solid? Crush the substance in a mortar with the pestle, then pour on the solvent, continually stirring the mixture.

What is meant by Circulatory solution? If the substance be placed in a bag and suspended in the solvent, a current will be engendered by the sinking of the dissolved portion from the bag, its place being supplied by fresh portions of the solvent.

What solvents are used in pharmacy? Water, first in importance, then Alcohol, Glycerin, Ether, Benzine, Chloroform, Bisulphide of Carbon, Acid, and Oils, take their respective rank as solvents.

How would you effect the solution of a gas in water? Apparatus is so arranged that the gas first passes through a wash bottle, by which it is purified, and then allowed to bubble up through the solvent, which absorbs a portion of it during the passage.

SEPARATION OF FLUIDS FROM SOLIDS.

Name some of the processes for separating fluids from solids. Lotion, Decantation, Colation, Filtration, Clarification, Expression, Percolation, etc.

What is meant by Lotion or Displacement washing? The process of separating soluble matter from a solid, by pouring a liquid upon it, which will dissolve and wash out the soluble portion. Ex. The washing of a precipitate in a funnel by means of a Spritz bottle.

Various automatic apparatus for continuing washing are described in works on pharmacy.

What is Decantation? Separating a liquid from a solid by pouring it off. This is sometimes better effected by a siphon.

Describe a Siphon. A siphon is an inverted U tube, with one leg longer than the other. It is first filled with the liquid, and the shorter arm immersed in the liquid contained in the vessel, and a current established in this way: The column of liquid in the shorter arm is overbalanced by the column in the longer arm, thus causing a current to flow from the shorter to the longer arm, the shorter arm drawing a fresh supply from the vessel, which is thus finally emptied.

What is meant by Colation, or Straining? The process of separating a solid from a fluid, by pouring the mixture upon a cloth or porous substance, which will permit the fluid to pass through, but will retain the solid.

What material is used for constructing Strainers? Gauze, Muslin, Flannel, Felt, etc.

What is meant by Filtration? The process of separating liquids from solids, with the view of obtaining the liquids in a transparent condition. *Filters* are made of paper, paper pulp, sand, asbestos, ground glass, charcoal, porous stone, etc.

Into what two general classes are paper filters divided? Plain and plaited. Plain filters are used for retaining and washing precipitates; plaited filters for ordinary filtering operations.

How are paper filters supported? In funnels.

What method is used for producing rapid filtration? Various methods are used, such as suction with the mouth, or by a column of falling water, to produce a partial vacuum beneath the filter, and thus hasten the process by increasing atmospheric pressure.

What is meant by Clarification? The process of separating from liquids, without the use of strainers or filters, solid substances which interfere with their transparency.

Describe the eight principal methods of Clarification.

1. *By the Application of Heat.* Heat, by diminishing the specific gravity of viscid liquids, permits the precipitation of the heavier particles, the lighter ones rising to the top. Boiling facilitates the separation, as the minute bubbles of steam adhere to the particles, and rise with them to form scum, which may be skimmed off.

2. *By Increasing the Fluidity of the Liquid.* This may be done by diluting it with water. Owing to the diminished specific gravity, the heavier particles sink, and the liquid may then be decanted.

3. *Through the use of Albumin.* If albumin be added to the turbid liquid, and heat applied, on coagulating it will envelop the particles, and rise to the top with them. Skimming will remove the scum.

4. *Through the use of Gelatin.* Gelatin will form with tannin an insoluble compound, and where cloudiness is due to the presence of tannin, will clarify the liquid in this way.

5. *Through the use of Milk.* Acids will precipitate the casein of milk. It is used in sour wines, etc., the precipitated casein carrying with it the insoluble particles.

6. *Through the use of Paper Pulp.* Agitate the liquid with the pulp and let it stand till clear; or throw the whole on a muslin strainer; the

pulp will form an excellent filtering medium by partially closing the meshes of the linen.

7. *By Fermentation.* Many substances soluble in the natural juices of plants are insoluble in the dilute alcoholic solutions resulting when these juices are fermented and subside as deposits.

8. *By subsidence through long standing.* The deposit formed is called a *sediment*.

What is the difference between a Sediment and a Precipitate? "Sediment is solid matter separated merely by the action of gravity from a liquid in which it has been suspended. A precipitate, on the other hand, is solid matter separated from a solution by heat, light, or chemical action."

What is Decoloration? The process of depriving liquids or solids in solution of color by the use of animal charcoal.

How would you separate Immiscible Liquids? By the use of a pipette, a glass syringe, a separating funnel, or a Florentine receiver. A funnel with a stop cock to stop the flow as soon as the heavier liquid has all passed through is called a separating funnel. A Florentine receiver, used in the distillation of volatile oils, differs from an ordinary receiver in having an overflow arranged to permit the escape of the condensed water while retaining the volatile oil.

What is meant by Precipitation? "The process of separating solid particles from a solution by the action of heat, light, or chemical substances." The solid particles separated are called the *precipitate*, the precipitate produced a *precipitant*, and the liquid remaining *supernatant liquid*. A precipitate may either fall or rise to the top of the supernatant liquid. The physical characteristics of precipitates are described by the words *curdy*, *granular*, *flocculent*, *gelatinous*, crystalline, bulky, etc. A *magma* is a thick, tenacious precipitate. Precipitation by heat is illustrated by the coagulation and precipitation of albumin when albuminous fluids are heated; and the precipitation of silver salts by light illustrates precipitation by light; and precipitation by chemical reaction occurs in a large number of instances when making official chemical salts.

What are the objects of Precipitation? 1st. A method of obtaining substances in the form of powder. 2. A method of purification. 3. A method of testing chemicals. 4. A method of separating chemical substances.

Vessels of glass called precipitating jars are made. They are larger at the bottom than the top. Hot, dense solutions usually produce heavy precipitates, and the reverse is the case when dilute solutions are employed. Precipitates may be collected in a funnel on filtering paper or on strainers.

CRYSTALLIZATION.

What is Crystallization? The process of placing substances under the most favorable circumstances for them to assume certain inherent geometrical forms called *crystals*. Substances that will not crystallize are called *amorphous*. *Crystallography* is that department of knowledge devoted to crystals. The objects of crystallization are to increase the purity and beauty of chemicals.

1. MEANING OF TERMS.

Faces—the planes bounding a crystal.

Edge—the intersection of two contiguous surfaces.

Angle—the intersection of three or more faces.

Perfect crystal—a crystal in which the faces, edges, or angles have equal faces, edges, or angles opposite to them, and if the middle point of the opposite faces or edges or the opposite angles be joined by straight lines, the point at which these lines intersect will be the center of the crystals.

Axes—the lines drawn through the center of crystals.

Dimorphous, trimorphous, polymorphous, etc.—when the same body crystallizes in two or more forms belonging to different systems.

Isomorphous—when different substances crystallize in the same form.

Prismatic—crystals extended principally in the direction of their longer axes.

Tabular—crystals with flat planes.

Laminae—crystals in the form of thin plates.

Acicular—needle-shaped.

Orthometric—those in which the three axes intersect at right angles.

Clinometric—those in which the axes intersect at oblique angles.

2. SYSTEMS.

Six different systems of crystallization are recognized. The word system is used because "every crystallizable body assumes its own characteristic form or some form directly derived from it by a single law," so that several forms may belong to the same system.

I. *Monometric or Regular*.—The angles of equal length intersecting at right angles.

II. *Dimetric or Quadratic*.—Three axes, two equal, the other different in length, all intersecting at right angles.

III. *Trimetric or Rhombic*.—Three axes of unusual length intersecting at right angles.

IV. *Hexagonal or Rhombohedral*.—Four axes, three of equal length, in the same plane, and inclined to one another at an angle of 60° . Fourth axis different length, and intersects the planes of the other three at right angles.

V. *Monoclinic or Oblique Prismatic*.—Three axes of unequal length; two obliquely inclined to each other, the other axis forming right angles with these two.

VI. *Triclinic or Doubly-oblique Prismatic*.—Three axes of unequal length, all obliquely inclined to each other.

What is meant by *Cleavage*? The tendency of crystals to split in one direction more than another.

By what methods would you obtain crystals? 1. By fusion and partial cooling (sulphur, camphor, etc). 2. Sublimation (corrosive sublimate). 3. Deposition from hot, supersaturated solutions on cooling. 4. Deposition during evaporation. 5. Galvanism (deposited while current is passing through solution). 6. Precipitation. 7. By adding a solid substance having a strong affinity for water. (If CaCl_2 be added to a solution of NaCl , the latter will crystallize out.)

What is meant by Water of Crystallization? In the act of crystallizing, many substances combine with water. This is known as water of crystallization. The amount varies in the same crystal under different circumstances. When crystals lose their water of crystallization, and form a white powder on their surfaces, they are said to *effloresce*. Crystals that absorb water from the air are said to be *hygroscopic*. The act is called *deliquescence*.

What is meant by Mother liquor? The liquid remaining after the crystals have formed.

What is Dialysis? The separation of crystallizable from non-crystallizable substances by osmosis.

What is a Dialyzer? A vessel with a parchment head, like a drum-head, at one end, into which the substances to be separated are placed in the form of solution. This is floated on distilled water, and by osmosis the crystallizable substance transudes through the membrane into the water below, leaving the non-crystallizable substance behind.

Crystalloids.—Crystallizable substances. Ex., sugar, salt, chemical substances.

Colloids.—Non-crystallizable substances—glue, gum, starch, dextrine, etc.

Diffusate.—The impregnated distilled water.

What is Maceration? Soaking a drug in a solvent until the soluble portions are dissolved.

What is Expression? The process of *forcibly* separating liquids from solids.

Name the six mechanical principles employed in constructing presses. 1. Spiral-twist Press. 2. Screw Press. 3. Roller Press. 4. Wedge Press. 5. Lever Press. 6. Hydraulic Press. (For full descriptions of these presses, see Remington's "Pharmacy.")

PERCOLATION.

What is Percolation? "Percolation is the process whereby a powder contained in a suitable vessel is deprived of its soluble constituents by the descent of a solvent through it." (Remington.)

By what other name is it called? Displacement.

Give a familiar example. The percolation of water through wood ashes, by which it is exhausted of its potash, etc., the solution being known as lye.

What is the use of this process in Pharmacy? It is used for extracting the virtues of drugs, in the preparation of tinctures, fluid extracts, etc.

Describe a Percolator. A Percolator is a cylindrical vessel with a porous diaphragm below, into which the drug, in the form of a powder, is introduced, and its soluble portions extracted by the descent of a solvent through it.

Describe the rationale of the process. The solvent, which is poured on the top of the powder, in passing downward exercises its solvent power on the successive layers of the powder until saturated, and is impelled downward by the combined force of its own gravity and that of the column

of liquid above, minus the capillary force with which the powder tends to retain it.

What is a Menstruum? The solvent is known technically by this name.

What is a Percolate? The liquid coming from the Percolator, impregnated with the soluble principles of the drug.

Why is Percolation also called the process of Displacement? Because it was first observed that ether, poured on powdered bitter-almonds, displaced the fixed oil which it contains without materially mixing with it.

Describe the condition in which the soluble principles exist in the powdered drug, and the effect of the solvent upon them. The soluble principles in the powdered drug exist in a hard and dry condition, and are generally contained in cells which are more or less disintegrated in grinding. The solvent takes up first the principle liberated by grinding, and afterward permeates the cells.

Why is it that each succeeding portion of percolate is less highly colored and less active than the one preceding it? Because the first portion of menstruum, in its descent through the powder, has the first opportunity to come in contact with the largest portions of the soluble principles, which are to be found in the finer dust scattered through the powder, and in the thoroughly disintegrated particles, which offer but slight resistance to the passage of the menstruum.

What are the directions of the U. S. P. upon Percolation? The process of percolation, or displacement, directed in this Pharmacopœia, consists in subjecting a substance, in powder, contained in a vessel called a percolator, to the solvent action of successive proportions of menstruum in such a manner that the liquid, as it traverses the powder in its descent to the recipient, shall be charged with the soluble portion of it, and pass from the percolator free from insoluble matter.

When the process is successfully conducted, the first portion of the liquid, or percolate, passing through the percolator will be nearly saturated with the soluble constituents of the substance treated; and if the quantity of menstruum be sufficient for its exhaustion, the last portion of the percolate will be destitute of color, odor, and taste, other than that possessed by the menstruum itself.

The percolator most suitable for the quantities contemplated by this Pharmacopœia, should be nearly cylindrical, or slightly conical, with a funnel-shaped termination at the smaller end. The neck of this funnel-end should be rather short, and should gradually and regularly become narrower toward the orifice, so that a perforated cork, bearing a short glass tube, may be tightly wedged into it from within, until the end of the cork is flush with its outer edge. The glass tube, which must not protrude above the inner surface of the cork, should extend from one and one-eighth to one and one-half inch (3 to 4 centimetres) beyond the outer surface of the cork, and should be provided with a closely-fitting, narrow tube, at least one-fourth longer than the percolator itself, and ending in another short glass tube, whereby the rubber tube may be so suspended that its orifice shall be above the surface of the menstruum in the percolator, a rubber band holding it in position.

The shape of a percolator should be adapted to the nature of the drug to

be operated upon. For drugs which are apt to swell, particularly when a feebly alcoholic or an aqueous menstruum is employed, a *conical* percolator is preferable. A *cylindrical* or only slightly tapering percolator may be used for drugs which are not liable to swell, and when the menstruum is strongly alcoholic, or when ether or some other volatile liquid is used for extraction. The size of the percolator selected should be in proportion to the quantity of drug to be extracted. When properly packed in the percolator, the drug should not occupy more than two-thirds its height. The percolator is best constructed of glass, or stone-ware, but, unless otherwise directed, may be made of any suitable material not affected by the drug or menstruum.

The percolator is prepared for percolation by gently pressing a small tuft of cotton into the space of the neck above the cork, and a small layer of clean and dry sand is then poured upon the surface of the cotton to hold it in its place.

The powdered substance to be percolated (which must be uniformly of the fineness directed in the formula, and should be perfectly air-dry before it is weighed) is put in a basin, the specified quantity of menstruum is poured on, and it is thoroughly stirred with a spatula or other suitable instrument, until it appears uniformly moistened. The moist powder is then passed through a coarse sieve—No. 40 powders, and those which are finer, requiring a No. 20 sieve; whilst No. 30 powders require a No. 15 sieve for this purpose. Powders of a less degree of fineness usually do not require this additional treatment after the moistening. The moist powder is now transferred to a sheet of thick paper, and the whole quantity poured from it to the percolator. It is then shaken down lightly and allowed to remain in that condition for a period varying from fifteen minutes to several hours, unless otherwise directed: after which the powder is pressed, by the aid of a plunger of suitable dimensions, more or less firmly, in proportion to the character of the powdered substance and the alcoholic strength of the menstruum; strongly alcoholic menstrea, as a rule, permitting firmer packing of the powder than the weaker. The percolator is now placed in position for percolation, and the rubber tube having been fastened at a suitable height, the surface of the powder is covered by an accurately-fitting disk of filtering paper or other suitable material, and a sufficient quantity of the menstruum poured on through a funnel reaching nearly to the surface of the paper. If these conditions are accurately observed, the menstruum will penetrate the powder equally until it has passed into the rubber tube and has reached, in this, the height corresponding to its level in the percolator, which is now closely covered to prevent evaporation, and the apparatus allowed to stand at rest for the time specified in the formula.

To begin percolation, the rubber tube is lowered and its glass end introduced into the neck of a bottle previously marked for the quantity of liquid to be percolated, if the percolate is to be measured, or of a tared bottle if the percolate is to be weighed; and by raising or lowering this recipient, the rapidity of percolation may be increased or lessened, as may be desirable, observing, however, that the rate of percolation, unless the quantity of material taken in operation is largely in excess of the Pharmacopœial quantities, shall not exceed the limit of ten to thirty drops in a minute. A layer of menstruum must constantly be maintained above the

powder, so as to prevent the access of air to its interstices, until all has been added, or the requisite quantity of percolate obtained. This is conveniently accomplished, if the space above the powder will admit it, by inverting a bottle containing the entire quantity of menstruum over the percolator in such a manner that its mouth may dip beneath the surface of the liquid, the bottle being of such shape that its shoulder will serve as a cover for the percolator.

When the dregs of a tincture, or of a similar preparation, are to be subjected to percolation, after maceration with all or with the greater portion of the menstruum, the liquid portion should be drained off as completely as possible, the solid portion packed in a percolator, as before described, and the liquid poured on, until all has passed from the surface, when immediately a sufficient quantity of the original menstruum should be poured on to displace the absorbed liquid, until the prescribed quantity has been obtained.

What is the best Percolator for common use? An ordinary glass funnel?

What is the objection to the glass funnel? It is too broad for use in percolating drugs for fluid extracts when the quantity of drug is large in proportion to the quantity of menstruum.

What is the desirable shape for making this class of preparations? A tall, narrow Percolator.

Why? Because it is desirable that the menstruum should traverse a higher column of powder.

What is gained by this? 1st. Every drop of menstruum is economically applied; 2d, the rate of flow is diminished; 3d, the percolate becomes saturated more rapidly; 4th, the operation is, therefore, more easily controlled.

What general rule may be given for selecting percolators? For making fluid extracts, a tall, straight percolator should be selected; for making a strong tincture, the percolator should be slightly bell-shaped and wider; for making weak fluid extracts, use a funnel.

How would you limit these rules? The character of the drug influences the limit. Those containing a large amount of soluble matter, like kino, cannot be percolated in a tall, narrow funnel, because the percolate would soon become too dense to descend.

What influences the degree of comminution proper for each substance? It depends, 1st, upon the physical structure of the drug; 2d, the ease with which the menstruum dissolves the desired constituents; 3d, the length of time required to exhaust the powder; 4th, the relative proportion of menstruum to drug.

Why does the Pharmacopœia direct that the drug shall be poured through a coarse sieve after moistening? To render it uniform.

Why should the powder be moistened? 1st, a moist powder, like a moist sponge, greedily absorbs moisture, but a dry powder, like a dry sponge, repels attempts to moisten it; 2d, dry powders have a tendency to swell when moistened, which, owing to the pressure of the particles against each other and the sides of the percolator, prevent menstrua from penetrating them.

State the exceptions to the rule for moistening powders? Powders

should not be moistened, 1st, when the addition of the menstruum would produce lumping, owing to the adhesive nature of the drug; 2d, when the moistened powder would offer too little resistance to the passage of the menstruum; 3d, those in which the menstruum is too volatile or too inflammable to render moistening desirable or safe. The cold percolation of sugar in making syrups illustrates the first; the preparation of oleoresins with ether illustrates the second and third.

Of what should the porous diaphragm be composed? Porous cotton, a deeply notched cork, or a perforated plug of cork or wood.

The porous diaphragm should be covered with clean sand, or a disk of scored filter paper, except when absorbent cotton is used. *Always* moisten the porous diaphragm with a *portion of the menstruum* before packing the percolator.

How should a percolator be packed? It should be packed in layers, each succeeding layer being packed according to the directions, "moderately" or "firmly," as the case may be, care being taken to use the same degree of pressure with each layer.

How would you test the correctness of the packing? By the descent of the menstruum, which should descend slowly and uniformly.

What general rule is given in relation to the degree of pressure to use in packing percolators? Porous, spongy drugs, and menstruum largely aqueous, require moderate packing. If a strongly alcoholic menstruum is directed, pack firmly.

How would you add the menstruum? Cover the top of the powder with a sheet of scored filter paper, place a weight upon it to keep it in place, and add the menstruum in divided portions, care being taken to follow with the succeeding portion before the first one has entirely disappeared, to prevent fissures forming in the powder, and the leaking of the menstruum through the fissures.

Why does the Pharmacopœia direct previous maceration of the powder before percolation? Because most drugs are not easily extracted by the menstruum, owing to the toughness of the powder, or nature of the desired principles, and maceration secures contact with the solvent for a longer time.

How is this maceration best effected? By introducing the moistened drug loosely into the percolator, and covering it closely, to prevent loss by evaporation.

How can it be determined if the drug is exhausted? Only by knowing beforehand what the active principles of the drug are, and testing the percolate, until they are no longer contained therein.

For example: The absence of bitterness in the percolate, from nuxvomica, opium, and cinchona, indicates that the bitter alkaloids, to which their activities are due, have been thoroughly extracted from the drug; the absence of color in the percolate of cochineal and saffron, indicates that the desired coloring matters have been exhausted from the drugs, and the absence of astringency in the percolate, of drugs whose activities are due to tannic acid, indicates that it has been completely extracted.

What is the best menstruum for extracting a drug? The best menstruum for extracting a drug is one that will deprive it of its active and

desirable principles, and leave in the residue those principles which are either inert or objectionable.

What other important points are to be taken into consideration in choosing a menstruum? A menstruum should always be chosen exactly adapted to the characteristics of the drug, and which will cause the retention of the soluble principles in a permanent form under the varying conditions of climate, and at the same time permit exposure to light, heat, and air without injury.

How can this be determined? Only by experiment.

Can it be accurately predetermined what amount of menstruum a powder will absorb and retain after percolation ceases? It cannot. The amount varies according to the nature of the drug employed, sometimes as much as eight to twenty per cent.

What great advantage does percolation have over maceration in respect to the character of liquid left in the residue? Maceration leaves a finished tincture in the residue; in percolation it is merely menstruum, the active portions of the drug having been dissolved in the preceding percolate.

How can absorbed menstrea be recovered? By distillation, or by treating the residue, first with weak alcohol, then with water.

When water causes a swelling of the substance and stops percolation, what expedients may be resorted to? Mix the residue with clean sawdust, rice chaff, or other inert dry substances, then percolate with water.

How may recovered distilled alcohol be purified? By treating it with permanganate of potassium (12 grains to the gallon), letting it stand a few days, then decanting or filtering.

In conducting the operation of Percolation, how would you control the flow of the Percolate? By the amount of pressure in packing; by raising or lowering the receiver containing the nozzle of the delivery tube, as directed by the U. S. P.; by using a stop-cock (objectionable); or by adopting one of the several forms of percolators devised for that purpose.

Mention some of the special percolators devised as improvements on the ordinary cylindrical and conical percolators, and the principles upon which they are founded. 1. Drusse's glass percolator. In this percolator evaporation is prevented by means of a ground-glass cover. The flow of the percolate is checked by screwing in the cover; should it flow too slowly, a piece of twine between the cover and the side will permit the necessary atmospheric pressure.

2. Squibb's Well-tube Percolator. In this percolator a large glass tube, called a well-tube, is placed in the centre of a stone ware crock and slightly raised from the bottom by absorbent cotton; around it is packed the substance to be percolated, the menstruum is poured on the powder, trickles through and rises in the well, from which it is siphoned.

3. Double-tube Percolator. An ordinary percolator is used. In it is placed a well tube, with a smaller tube telescoped therein, the end of the latter projecting for a few inches below the percolator through a tightly-fitting cork. The well-tube rests on absorbent cotton. The menstruum

percolates through the powder, permeates the cotton, and rises in the well-tube to the top of the smaller tube therein, over which it runs into the tube and out, being received in a vessel below. The height of the percolate in the well tube, and consequently the rapidity of the flow, is controlled by raising or lowering the inner tube.

4. Suspended Percolator (Hance Bros. & White). This percolator is so arranged, being suspended by trunnions from a beam, that it can be readily turned upside down and emptied of its contents. It is suitable for large operations.

How would you support a Percolator? Several methods are in use; 1st, the ordinary retort stand (flimsy); 2d, Remington's Percolating Stand; this instrument consists of two parallel shelves, one above the other; each shelf consists of two parallel strips having slots down the centre, fastened to which, by thumb-screws working in the slots, are cross pieces, having their inside edges hollowed out to receive the percolator. The cross-pieces may be slid either way to enlarge or reduce the space between them so as to fit percolators of all sizes. This excellent apparatus is suspended from the wall by brackets. The advantage is that it enables all percolating and filtering operations to be carried on with convenience in one place, thus saving time and labor.

3. Shinn's Percolating Closet consists of adjustable retort rings sliding up and down on gas-pipe supports, with conveniently arranged shelves, all enclosed in a convenient closet.

What kind of Receiving Bottles should be used for the Percolate? Wide-mouth bottles are preferred. Where special accuracy is required, use a flask with a double mark on the neck. Bottles may be graduated by pasting a paper slip on the side, pouring in accurately measured quantities of water, carefully marking the height at each addition. A strip of adhesive plaster answers an excellent purpose.

What is meant by Repercolation? Repercolation is a process introduced by Dr. Squibb, and consists in "the successive application of the same percolating menstruum to fresh supplies of the substance to be percolated."

What are its advantages? By passing the weaker portions of the percolate through fresh portions of drug, it becomes thoroughly saturated. In this way a portion of the percolate will do work as menstruum, resulting in the saving of menstruum.

What is Fractional Percolation? A term used to define percolation when applied to two successive portions of powder. (Principle identical with repercolation).

PART II.

THE FORMS OF PHARMACEUTICAL PREPARATIONS DIRECTED BY THE UNITED STATES PHARMACOPŒIA.

CLASSIFICATION OF OFFICINAL PREPARATIONS.

LIQUIDS.		(Remington.)	SOLIDS.
Made without percolation or maceration.	Made by percolation or maceration.	Made by percolation or maceration.	Made without percolation or maceration.
<i>Aqueous Solutions.</i>	<i>Aqueous Liquids.</i>	Extracts, Resins.	Powders, Triturations, Masses, Confections, Pills, Troches, <i>Cerates,</i> <i>Ointments,</i> <i>Plasters,</i> <i>Papers,</i> <i>Suppositories.</i>
Waters, Solutions.	Infusions, Decoctions.		
<i>Aqueous Solutions Containing Sweet or Viscid Substances.</i>	<i>Alcoholic Liquids.</i>		
Syrups, Honeys, Mucilages, Emulsions, Mixtures, Glycerites.	Tinctures, Wines, Fluid Extracts.		
	<i>Ethereal Liquids.</i>		
	Oleoresins.		
	<i>Acetous Liquids.</i>		
	Vinegars.		
<i>Alcoholic Solutions.</i>			
Spirits, Elixirs.			
<i>Ethereal Solutions.</i>			
<i>Collodions.</i>			
<i>Oleaginous Solutions.</i>			
<i>Liniments,</i> <i>Oleates.</i>			

Roman type, internal use.

Italic type, external use.

LIQUIDS.

AQUEOUS SOLUTIONS.

AQUE—WATERS.

What is an Aqua, or Water? An aqueous solution of a volatile substance.

How many Official Waters are there? Fourteen.

How are Waters prepared? They are prepared by five methods.

1. Solution in water (cold or hot). 2. Filtration through an impregnated powder. 3. Percolation through impregnated absorbent cotton. 4. Distillation. 5. Chemical decomposition.

FOUR CLASSES.

1. SIMPLE SOLUTION—(4). *Aqua Amygdale Amare* (0.1 per cent. oil bitter almonds), *Aqua Creosoti* (1 per cent. creosote), *Aqua Chloroformi* (saturated solution, with excess of chloroform present), *Aurantii Florum*.

2. BY PASSING GASES THROUGH WATER—(3). *Aqua Ammonie* (10 per cent. gas), *Ammonie Fortior* (28 per cent. gas), *Chlori* (0.4 per cent. gas).

3. PERCOLATION THROUGH IMPREGNATED PRECIPITATED CALCIUM PHOSPHATE—(6). *Aqua Anisi* (0.2 per cent. oil), *Camphoræ* (0.8 camphor in alcohol), *Cinnamomi*, *Feniculi*, *Mentha Piperite*, *Mentha Viridis* (each 0.2 per cent. volatile oil).

4. DISTILLATION—(5). *Aqua Aurantii Florum Fortior* (water saturated with the volatile oil from fresh flowers), *Aurantii Florum* (stronger or'g. fl. water and distilled water, equal volumes), *Destillata* (800 parts from 1000 of water), *Rosæ Fortior* (water saturated with the volatile oil of rose petals), *Rosæ* (stronger rose water diluted one-half).

5. CHEMICAL DECOMPOSITION—(1). *Aqua Hydrogenii Dioxide* (solution of hydrogen dioxide or peroxide, containing about 3 per cent. by weight of the pure dioxide).

LIQUORES—SOLUTIONS.

What is a Liquor, or Solution? This class includes all aqueous solutions of non-volatile substances, except those naturally classed distinctly syrups, infusions, and decoctions.

1. SIMPLE SOLUTIONS—(9). *Liquor Acidi Arsenosi* (1 per cent. As_2O_3 , 5 per cent. HCl); *Arseni et Hydrargyri Iodidi* (1 per cent. each); *Calcis* (saturated $Ca_2H(O)$); *Iodi Compositus* (5 per cent. I, 10 per cent. KI); *Plumbi Subacetatis Dilutus* (3 per cent. Sol. Subac. Lead); *Potassæ* (5.6 per cent. Potassa, 2d formula); *Sodæ* (5.6 per cent. Soda, 2d formula); *Sodii Arsenatis* (1 per cent. Sod. Arsenatis); *Sodii Silicatis* (nearly saturated).

2. CHEMICAL SOLUTIONS—(Aqueous). (16.) *Liquor Ammonii Acetatis* (Dil. $HC_2H_3O_2$ + ammonium carbonate); *Ferri Acetatis* (Ferric Hydrate, glacial acetic acid, water—31 per cent. Ferric Acetate); *Ferri Chloridi* (Iron, HCl, HNO_3 , and Water—37.8 per cent. Ferric Chloride); *Ferri Citratis* (Ferric Hydrate, Citric Acid, Water—43 to 44 per cent. scaled salt); *Ferri et Ammonii Acetatis* (Basham's Mixture); *Ferri Nitratis*

(Ferric Hydrate, HNO_3 , Water—6.2 per cent. Ferric Nitrate); *Ferri Subsulphatis* (Ferrous Sulphate, H_2SO_4 , HNO_3 , Water—43.7 per cent. salt); *Ferri Tersulphatis* (Ferrous Sulph., H_2SO_4 , HNO_3 , Water—28.7 per cent. salt); *Hydrargyri Nitratis* (40 per cent. Hg. red ox., 45 per cent. HNO_3 , Water—50 per cent. (about) Mercuric Nitrate); *Alagnesi Citratis* (Mg. Carb., Cit. Acid, Syrup of Cit. Acid, KHCO_3 , Water); *Plumbi Subacetatis* (Pb. acet., Pb. ox., Water—25 per cent. (about) Subacetate Lead); *Potassie* (KHCO_3 , Lime Water—5 per cent. (about) Potassa); *Potassi Citratis* (KHCO_3 , Cit. Acid, Water—9 per cent. (about) Potas. Cit.); *Potassii Arsenitis* (1 per cent. Arsenic, 1 per cent. KHCO_3 , 3 per cent. Tr. Lav. Comp.); *Sodæ* (Na_2CO_3 , Lime Water—5 per cent. (about) NaHO); *Sodæ Chloratæ* (Na_2CO_3 , Chlor. Lime Water—at least 2.6 per cent. avail. Cl); *Zinci Chloridi* (Zinc, HNO_3 , Precip. Carb. Zn.HCl , Water—50 per cent. (about) Zn Chloride).

AQUEOUS SOLUTIONS CONTAINING SWEET OR VISCID SUBSTANCES.

SYRUP—SYRUPS.

What is a Syrup? A concentrated solution of sugar in water or in an aqueous liquid.

There are three kinds of syrups:—

1. SYRUP, or SIMPLE SYRUP.—Sugar and water.

2. MEDICATED SYRUP.—Syrup containing various medicinal substances.

3. FLAVORED SYRUP.—Syrup used as flavor only.

What is Sugar? Sugar is in white, dry, hard, distinctly crystalline granules, permanent in the air, odorless, having a purely sweet taste, and a neutral reaction. Commercially known as “granulated sugar.”

Name the four official methods for preparing Syrups. 1. *Solution with heat.* 2. *Agitation without heat.* 3. *Simple addition.* 4. *Digestion or maceration.*

Syrups may often be prepared advantageously by *Percolation*. (See Remington's “Practice of Pharmacy.”)

There are thirty-four syrups (four classes):—

1. SOLUTION WITH HEAT—(5). *Syrupus*—85 gm. Sugar; Dist. Water to 100 c.c. *Calcis*—65 p. Lime; 400 p. Sugar; Water to 1000 p. *Ferri Iodidi*—10 per cent. Ferrous Iodide; 83 p. syrup; Dist. Water to 1000 p. *Rubi Idoi*—40 p. fermented and filtered Raspberry juice; 60 p. Sugar. *Ferri Quinine et Strychnine Phosphatum*—Sol. Ferric Phos. 20 gm.; Quin. Sulph. 30 gm.; Strychnine 0.2 gm.; Phos. Acid 48 c.c.; Glycerin 100 c.c.; Water 50 c.c.; Syrup to 1000 c.c.

2. SIMPLE ADDITION—(10). *Syrupus Acacie*—25 p. Mucilage; Syrup to 100 p. *Acidi Citrici*—10 p. Cit. Acid; 10 p. Sp. Lemon; 10 p. Water; Syrup to 1000 p. *Rhei*—Fld. Ext. Rhei, 100 p.; Sp. Cin. 4 p.; Potass. Carb. 10 p.; Glycerin 50 p.; Water 50 p.; Syrup to 1000 p. *Rhei Aromaticus*—15 p. Arom. Tr. Rhei; Syrup to 100 p. *Ipecacuanhæ*—7 p. Fld. Ext. Ipecac; 1 p. Acetic Acid; 10 p. Glycerin; 70 p. Sugar; Water to 100 p. *Kramerie*—45 p. Fld. Ext. Kram.; 55 p. Syrup. *Lactucarii*—10 p. Tr. Lac.; 5 p. Prec. Cal. Phos.; 75 p. Sugar; Water q. s. ft. 100 p. *Rosæ*—12.5 p. Fld. Ext. Rose; 87.5 p. Syrup; Water q. s. ft.

100 p. *Rubi*—20 p. Fld. Ext. Rubus; 80 p. Syrup. *Senegæ*—200 p. Fld. Ext. Senega; 5 p. Aq. Ammon.; 700 p. Sugar; Water to 1000 p.

3. AGITATION WITHOUT HEAT.—(17). *Syrupus Allii*—20 p. Garlic; 80 p. Sugar; Dil. Acet. Acid q. s. fl. 100 p. • *Scillæ*—45 p. Vinegar Squill; 80 p. Sugar; Water q. s. fl. 100 p. *Altheæ*—5 p. Alth.; 70 p. Sugar; 3 p. Alcohol; Glycerin 10 p.; Water to 100 p. *Pruni Virginianæ*—15 p. W. Cherry; 5 p. Glvc.; 70 p. Sugar; Glycerin 15 p.; Water to 100 p. *Rhei*—10 p. Fld. Ext. Rhei; 1 p. K_2CO_3 ; 4 p. Spts. Cin.; 5 p. Glycerin; 5 p. Water; Syrup to 100 p. *Sennæ*—25 p. Senna; 70 p. Sugar; 15 p. Alcohol; 5 p. Ol. Coriand.; Water to 100 p. *Amygdalæ*—14 p. Sweet Almond; 4 p. Bitter Almond; 20 p. Sugar; 10 p. Orange Fl. Water; Water to 100 p. *Aurantii*—5 p. Sweet Or. Peel; 70 p. Sugar; Water to 100 p. *Sarsaparillæ Compositus*—200 p. Fld. Ext. Sarsaparilla; 20 p. Guaiac Wood; 12 p. Pale Rose; 15 p. Fld. Ext. Glycyrrhiza; 15 p. Fld. Ext. Senna; 0.1 p. Ol. Sassafras; 0.1 p. Ol. Anise; 0.1 p. Ol. Gaultheria; 650 p. Sugar; Dil. Alch. and Water to 1000 parts. *Scillæ Compositus*—80 p. Fld. Ext. Squill; 80 p. Fld. Ext. Senega; 2 p. Tart. Emetic; 750 p. Sugar; 10 p. Prec. Phos. Calcium; Water to 1000 p. *Zingiberis*—30 p. Fld. Ext. Ginger; 850 p. Sugar; Water to 1000 p. *Aurantii Florum*—85 p. Sugar; Or. Fl. Water to 100 p. *Hypophosphitum*—45 p. Ca; 15 p. Na; 15 p. K (Hypophosphites); 2 p. Dil. Hypophosphorous Acid; 5 p. Spts. Lemon; 500 p. Sugar; Water to 1000 p. *Hypophosphitum cum Ferro*—1 p. Ferrous Lactate; 1 p. K. Citrate Syrup Hypophos. to 100 p. *Acidi Hydriodici*—1 per cent. Absolute Hydriodic Acid; Syrup; Spt. Orange; Sugar; Dist. Water to 1000 p. *Calcii Lactophosphatis*—25 p. Precip. Phos. Ca; 60 p. Lac. Acid; 36 p. Phos. Acid; 25 p. Or. Fl. Water; 700 p. Sugar; Water to 1000 p.

4. MACERATION OR DIGESTION.—(2). *Syrupus Picis Liquidæ*—75 p. Tar; 150 p. Cold Water; 400 p. Boiling Dist. Water; 100 p. Glycerin; 800 p. Sugar; Dist. Water to 1000 p. *Tolutanus*—10 p. Tolu; 85 p. Sugar (50 p. Alcohol); Dist. Water to 100 p.

MELLITA—HONEYES.

What are Mellita or Honeyes? Thick liquid preparations closely allied to syrups, differing merely in the use of honey as a base, instead of syrup.

There are three official honeyes:—

1. *Mel*; Commercial Honey. A saccharine secretion deposited in the honey-comb by *Apis Mellifica*. 2. *Mel Despumatum*; Clarified Honey; Commercial honey clarified by heating and straining. 3. *Mel Rosæ*—12 p. Fld. Ext. Rose; Clar. Honey to 100 p.

MUCILAGINES—MUCILAGES.

What are Mucilagines or Mucilages? Thick, viscid, adhesive liquids, produced by dissolving gum in water, or by extracting with water the mucilaginous principles from vegetable substances.

1. WITHOUT HEAT.—(3). *Mucilago Acaciæ*—34 p. Acacia; Water to 100 p. *Sassafras Medullæ*—2 p. Sas. Pith; Water to 100 p.

2. WITH HEAT.—(2). *Mucilago Tragacanthæ*—6 p. Tragacanth; 18 p. Glycerin; Water to 100 p. *Umi*—6 p. Elm. Boiling Water 100 p.

EMULSIONS.

What is an Emulsio, or Emulsion? A soft, liquid preparation resembling milk, and consisting of an oily or resinous substance suspended in water by means of gum or mucilage.

Emulsum Ammoniaci: Ammoniac, 4 gm.; Water to 100 c.c. *Amygdalæ*: Sweet Almond, 6 gm.; Acacia, 1 gm.; Sugar, 3 gm.; Water to 100 c.c. *Asafetide*: Asafet, 4 gm.; Water to 100 c.c. *Chloroformi*: Chloroform, 4 c.c.; Ess. Ol. Almond, 6 c.c.; Tragacanth, 1.5 gm.; Water to 100 c.c.

MISTURÆ—MIXTURES.

What are Misturæ, or Mixtures? Aqueous liquid preparations intended for internal use, which contain suspended insoluble substances.

Mistura Crete—20 gm. Comp. Chalk Powd.; 40 c.c. Cin. Water; 40 c.c. Water. *Ferri Composita*—6 gm. Sulph. Iron; 1.8 gm. K_2CO_3 ; 1.8 gm. Myrrh; 1.8 gm. Sugar; 60 c.c. Spts. Lav.; q. s. Rose Water to 100 c.c. *Glycerrhizæ Composite* [Brown Mixture]—Pure Ext. Glycyrr., 30 gm.; Syrup, 50 c.c.; Mucilago Acaciæ, 100 c.c.; Tr. Opii Cam., 120 c.c.; Wine Antimony, 60 c.c.; Sp. Nit. Ether, 30 c.c.; Water q. s. ft. 1000 c.c. *Rhei et Soda*—35 gm. $NaHCO_3$; 15 c.c. Fl. Ext. Rhei; 3 c.c. Fl. Ext. Ip; Glycerin, 300 c.c.; Spt. Pep., 35 c.c.; Water, q. s. ft. 1000 c.c.

GLYCERITÆ—GLYCERITES.

What are Glyceritæ, or Glycerites? Mixtures of medicinal substances with glycerine.

There are eight official glycerites:—

Glyceritum Vitelli—45 gm. Fresh Yolk Egg; 55 gm. Glycerine. *Acidi Carbolicæ*—2 A. to 8 G. *Acidi Tannici*—2 A. to 8 G. *Amyli*—Starch, 1 gm.; Water, 1 c.c.; Glycerine, 8 c.c. *Boroglycerini* [Glycerite of Glyceryl Borate, Solution of Boroglyceride]—Boric Acid, 310 gm.; glycerine q. s. ft. 1000 gm. Heat glycerine (460 gm.) not above $150^{\circ}C$ ($302^{\circ}F$.), add boric acid, dissolve, reduce to 500 gm., add 500 gm. glycerine. *Hydrastis*—1000 gm. of hydrastis to make 1000 gm. of glycerite, made by percolating with alcohol, adding water to the percolate, driving off the alcohol by evap. and dist., adding water to 500 c.c., and adding 500 c.c. of glycerine.

ALCOHOLIC SOLUTIONS.

SPIRITUS—SPIRITS.

What are Spiritus, or Spirits? Alcoholic solutions of volatile substances.

There are twenty-five official spirits (five classes):—

1. SIMPLE SOLUTIONS—(15). *Spiritus Aetheris*—325 c.c. Ether; 675 c.c. Alcohol. *Aetheris Compositus*—325 c.c. Eth.; 25 c.c. Eth. Oil; 50 c.c. Alcohol. *Ammonia Aromaticus*—34 gm. Ammon. Carb.; 90 c.c. Ammon. Water; 10 c.c. Ol. Lemon; 1 c.c. Ol. Lav. Flor.; 1 c.c. Ol. Nutmeg; 700 c.c. Alcohol; Water q. s. ft. 1000 c.c. *Amygdalæ Amara*—Ol. Bit.

Almond 10 c.c.; Alcohol, 800 c.c.; Water q. s. ft. 1000 c.c. *Anisi*—100 c.c. Ol. Anise; 900 c.c. Deod. Alcohol. *Aurantii*—50 c.c. Ol. Orange Peel; 950 c.c. Alcohol. *Camphoræ*—100 gm. Cam.; Alc. q. s. ft. 1000 c.c. *Chloroformi*—60 c.c. Purif. Chlor.; 940 c.c. Alcohol. *Cinnamomi*—100 c.c. Ol. Cin.; 900 c.c. Alcohol. *Gaultheriæ*—50 c.c. Ol. Gaul.; 950 c.c. Alcohol. *Juniperi*—50 c.c. Ol. Jun.; 950 c.c. Alcohol. *Juniperi Compositus*—8 c.c. Ol. Jun.; 1 c.c. Ol. Caraway; 1 c.c. Ol. Fennel; 1400 c.c. Alcohol; Water q. s. ft. 2000 c.c. *Lavendulæ*—50 c.c. Ol. Lav. Fl.; 950 c.c. Deod. Alcohol. *Myrciæ*—16 c.c. Ol. Myrcia; 1 c.c. Ol. Orange Peel; 1 c.c. Ol. Pimenta; 1220 c.c. Alcohol; Water q. s. ft. 2000 c.c. *Myristicæ*—50 c.c. Ol. Nutmeg; 950 c.c. Alcohol.

2. WITH MACERATION—(3). *Spiritus Limonis*—50 c.c. Ol. Lem.; 50 gm. Lem. Peel (fresh); Deod. Alcohol to 1000 c.c. *Mentha Viridis*—100 c.c. Ol. Pep.; 10 gm. Pip. Herb; Alcohol to 1000 c.c. *Mentha Viridis*—100 c.c. Ol. Spearmint; 10 gm. Spearmint Herb; Alcohol to 1000 c.c.

3. BY GASEOUS SOLUTION.—*Spiritus Ammoniac*—Stronger Am. Water; Heat; Alcohol; 10 per cent. gas; assay.

4. BY CHEMICAL REACTION.—*Spiritus Ætheris Nitrosi*. 11 times its own volume Ethyl Nitrite.

5. BY DISTILLATION.—*Spiritus Frumenti*—from fermented grain; must be two years old. *Vini Gallici*—from fermented grapes; must be at least four years old.

ELIXIRIA—ELIXIRS.

What are Elixiria, or Elixirs? Elixirs are aromatic, sweetened, spirituous preparations, containing small quantities of active medicinal substances. There are two official elixirs; *Elixir Aromaticum*—Comp. Spts. Orange, 12 c.c.; Syr, 375 c.c. (Prec. Calc. Phos. 15 gm. for filtering); Deod. Alcohol, Dist. Water, of each q. s. to make 1000 c.c. *Elix. Phosphori*.—Spts. Phos., 210 c.c.; Ol. Anise 2 c.c.; Glycerine 550 c.c.; Aromat. Elix. q. s. ft. 1000 c.c.

ETHEREAL SOLUTIONS.

COLLODIA—COLLODIONS.

What are Collodia, or Collodions? Collodions are liquid preparations intended for external use, having for the base a solution of Pyroxylin, or gun-cotton, in a mixture of ether and alcohol. They leave a film on evaporation, which serves as a protection or an application of a medicinal ingredient to the skin. In the following description: P = Pyroxylin; E = Ether; A = Alcohol

There are four official collodions: *Collodium*—3 p. P.; 75 p. E.; 25 p. A.; decant the clear collodion from the sediment. *Collodium Cantharidatum*—60 p. Canthar.; 85 p. Flex. C.; Chlor. q. s. to exhaust Canth.; after dist. should weigh 16 p.; decant the clear Canthar. Collod. from the sediment. *Flexile*—92 p. Col.; 5 p. Canada Turpentine; 3 p. Castor Oil. *Stypticum*—20 p. Tannic Acid; 5 p. A.; 25 p. E.; 55 p. Col.

OLEAGINOUS SOLUTIONS, FOR EXTERNAL APPLICATION.

LINIMENTA—LINIMENTS.

There are nine official liniments (three classes):—

1. BASE, COTTON SEED OIL.—*Linimentum Ammoniacum*—35 p. Ammon. W.; 5 p. Alcohol; 60 p. Oil. *Calci* [Carron Oil]—1 volume Lime W.; 1 volume Oil. *Camphoræ*—20 p. Cam.; 80 p. Oil.

2. BASE, ALCOHOL.—*Linimentum Belladonnæ*—5 p. Cam.; 95 p. Ext.; Bel. fl. *Chloroformi*—3 p. Com. Chlorof.; 7 p. Soap Lin. *Saponis*—7 p. Soap; 4.5 p. Cam.; 1 p. Ol. Rosemary; 75 p. A.; W. q s. fl. 100 p. *Sinapis Compositum*—3 p. Vol. Ol. Mustard; 20 p.Fld. Ext. Mezereum; 6 p. Cam.; 15 p. Cas. Oil.; 55 p. Alcohol.

3. BASE, OIL OF TURPENTINE. *Saponis Mollis*—[Tr. Sap. Vir., Pharm. 1880]—Soft Soap, 65 p.; Ol. Lav., 2 p.; Alcohol, 30; Water q. s. fl. 100 p. *Terebinthinæ*—65 p. Res. Cerate; 35 p. Ol. Turp.

OLEATA—OLEATES.

What are Oleata, or Oleates? The official Oleates are liquid preparations, made by dissolving metallic salts, or alkaloids, in oleic acid. They are not assumed to be definite chemical compounds.

There are three official oleates: *Oleatum Hydrargyri*—20 p. Yel. Ox. Hg.; 80 p. Ol. Acid. *Veratrinæ*—2 p. Veratrine; 98 p. Ol. Acid. *Zinci*—Zn. Oxide 5; Oleic Acid 95.

AQUEOUS LIQUIDS MADE BY PERCOLATION OR
MACERATION.

INFUSA—INFUSIONS.

What are Infusa, or Infusions? Infusions are liquid preparations, made by treating vegetable substances with either hot or cold water. They are not boiled, though boiling water is often employed.

INFUSIONS—FOUR METHODS.

1. PREPARED BY MACERATION.—*General Formula, U. S. P.*—"An ordinary infusion, the strength of which is not directed by the physician, nor specified by the Pharmacopœia, shall be prepared by the following formula:—

"Take of—

By Measure.

THE SUBSTANCE, coarsely comminuted,

fifty grammes, 50 gm.

BOILING WATER, 1000 cubic centimeters, 1000 c.c.

WATER, a sufficient quantity

To make 1000 cubic centimeters . . 1000 c.c.

"Put the substance into a suitable vessel provided with a cover, pour upon it the Boiling Water, cover the vessel tightly, and let it stand for two hours. Then strain, and pass enough water through the strainer to make the infusion measure 1000 cubic centimeters.

“Caution.”—The strength of infusions of energetic or powerful substances should be specially prescribed by the physician.”

Various styles of infusion jars, pitchers, and mugs are described in Remington's “Practice of Pharmacy.”

Infusion Digitalis—Dig. 15 gm.; Alcohol, 100 c.c.; Cin. Water, 150 c.c.; Boiling Water, 500 c.c.; Cold Water q. s. ft. 1000 c.c. *Senna Compositum*—60 gm. Senna; 120 gm. Manna; 120 gm. Mag. Sulph.; 20 gm. Fennel; Boiling W., 800 c.c.; Cold W. q. s. ft. 1000 c.c.

2. BY DIGESTION.—Let stand at moderate heat below boiling. Very useful method, though it may not be directed in formula.

3. BY PERCOLATION.—Should be used whenever practicable. *Infusum Cinchone*—60 gm. Cinch.; 10 c.c. Arom. Sulph. Acid; Water q. s. ft. 1000 c.c. *Pruni Virginianæ*—4 per cent. Wild-Cherry Bark; Water.

4. BY DILUTING FLUID EXTRACTS.—“Improper and unjustifiable, except in those few cases in which the active and desirable principles of the drug are equally soluble in alcohol and in water, or in the menstruum used for both fluid extract and infusion.”

DECOCTA—DECOCTIONS.

What are Decocta, or Decoctions? Decoctions are liquid preparations, made by *boiling* vegetable substances with water.

For description of various decoction vessels, see Remington's “Practice of Pharmacy.”

General Official Formula.—“An ordinary decoction, the strength of which is not directed by the physician, nor specified by the Pharmacopœia, shall be prepared by the following formula:—

“Take of—

By Measure.

THE SUBSTANCE, coarsely comminuted, . 50 gm.

WATER, a sufficient quantity

To make 1000 cubic centimetres, . 1000 c.c.

“Put the substance in a suitable vessel provided with a cover, pour upon it 1000 c.c. of cold water, cover it well, and boil for fifteen minutes; then let it cool to about 40° C. (104° F.), strain the liquid, and pass through the strainer enough cold water to make the product measure 1000 c.c.

“Caution.”—The strength of decoctions of energetic or powerful substances should be specially prescribed by the physician.”

Decoctum Cetrariæ.—5 gm. Cetraria; W. to 1000 c.c. *Sarsaparille Compositum*—Sar. 100 gm.; Sas. 20 gm.; Guaiac Wood 20 gm.; Glycyrr. 20 gm.; Mezereum 10 gm.; W. to make 1000 c.c.

ALCOHOLIC LIQUIDS MADE BY PERCOLATION OR MACERATION.

TINCTURÆ—TINCTURES.

What is a Tincture? A tincture is an alcoholic solution of a medicinal substance.

How does a Tincture differ from a Spirit? The latter, with one

exception, are solutions of *volatile* substances in alcohol, while the former are of non-volatile substances.

By what processes may Tinctures be prepared? By *percolation*, *maceration*, *solution*, or *dilution*.

What menstrua are used in preparing them? Alcohol, diluted alcohol of various strengths, aromatic spirits of ammonia, or mixtures of alcohol, water, and glycerine.

How many officinal Tinctures are there? Seventy-three.

Give an example of a Tincture made by solution or dilution. Tr. Iodine is an example. It is made by dissolving Iodine in alcohol.

Into what two general classes may Tinctures be divided? Into simple and compound Tinctures.

Why is Glycerin used in Tinctures? To prevent precipitation on standing.

COMPOUND TINCTURES.

There are seventeen compound Tinctures:—

Tinctura Opii Camphorata—4 p. Opium; 4 p. Benz. Acid; 4 p. Oil Anisi; 4 p. Camphor; 4 p. Glycerin; Menstruum dilute Alcohol. *Lavandulæ Composita*—8 p. Oil Lav.; 2 p. Oil Rosemary; 2 p. Cinnamon; 5 p. Cloves; 1 p. Nutmeg; 1 p. Red Saunders; Menstruum (70 p. A.; 25 p. W.). *Cardamomi Composita*—2 p. Card.; 2 p. Cinnamon; 1 p. Caraway; 5 p. Cochineal; Mens. Dil. A.; 5 per cent. Glycer. *Gentianæ Composita*—10 p. Gent.; 4 p. Bit. Orange Peel; 1 p. Cardamom; Mens. A. 60; W. 40. *Rhei*—10 p. Rhub.; 2 p. Card.; 10 Glyc.; Mens. A. 6; W. 3. *Rhei Dulcis*—10 p. Rhub.; 4 p. Glycyrrhiz.; 4 p. Anise; 1 p. Card.; 10 Glycer.; Mens. A. 5; W. 4. *Aloes et Myrrha*—10 p. Aloes; 10 p. Myrrhæ; 10 p. Liquor. Root; Mens. A. 75; W. 25. *Aloes*—10 p. Aloes; 20 p. Glycyrrhiz.; Mens. Dil. A. *Lactucarii*—Purify 500 gm. Lactucarium with Benzine, Percolate with A. 50; Gly. 25; W. 20 (for making Syr. Lactucarium); *Catechu Composita*—10 p. Catechu; 5 p. Cinnamon; Mens. Dil. A. *Cinchonæ*—Cinchona 20; Glycerin 7.5 M.; Alcohol 67.5; Water 25. *Cinnamomi*—Ceylon Cinnamon 10 p.; Gly. 5; Mens. A. 75; W. 20; *Gallæ*—Gall 20; Gly. 10; Mens. Alcohol. *Kino*—Kino 10; Gly. 15; M. A. 20; W. 65. *Sanguinariæ*—Sang. 15; Acetic Acid 2; Mens. A. 60; W. 40; *Ipecacuanhæ et Opii*—10 p.Fld. Ext. Ipecac.; Deod. Tr. Opii to 100 p.; Mens. Dil. A. *Cinchonæ Composita*—10 p. R. Cinch.; 8 p. B. Orange Peel; 2 p. Serp.; Mens. A. 85; W. 70; Glycer. 7.5. *Benzoini Composita*—12 p. Benz.; 2 p. Aloes; 8 p. Storax; 4 p. Bals. Tolu; Mens. A. *Rhei Aromatica*—20 p. Rhub.; 4 p. Cinnam.; 4 p. Cloves; 2 p. Nutmeg; Glyc. 10; Mens. A. 5; W. 4.

SIMPLE TINCTURES.

There are 52 simple Tinctures. They may be arranged according to strength of drug, as follows: 4, 5 per cent. Tinctures—*Tinctura Capsici*; *Cantharidis*; *Moschi*; *Strophanthi*; 1, 7 per cent. tinctures—*Iodi*. 16, 10 per cent. tinctures—*Opii*; *Sumbul*; *Serpentariæ*; *Stramonii Seminis*; *Matico*; *Chirata*; *Physostigmatis*; *Bryonia*; *Arnica Radicis*; *Croci*; *Tolutana*; *Opii Deodorati*; *Calumbæ*; *Vanillæ*; *Cardamomi*;

Qua sic. 7, 15 per cent. tinctures—*Gelsemii*; *Belladonna Foliorum*; *Cannabis Indica*; *Hyoscyami*; *Scilla*; *Colchici Seminis*; *Digitalis*. 21, 20 per cent. tinctures—*Cubebe*; *Cimicifuga*; *Asafetida*; *Benzoini*; *Guaiaci*; *Pyrethri*; *Quilaja*; *Aurantii Dulcis*; *Zingiberis*; *Guaiaci Ammoniata*; *Valeriana Ammoniata*; *Humuli*; *Krameria*; *Myrrha*; *Arnica Florum*; *Lobelia*; *Hydrastis*; *Valeriana*; *Nucis Vomica*; *Aurantii Amari*; *Calendula*. 1, 25 per cent. tincture—*Ferri Chloridi*. 1, 35 per cent. tincture—*Aconiti*. 1, 40 per cent. tincture—*Veratri Viridis*.

TINCTURES OF RECENT PLANTS.

How would you prepare the U. S. P. Tincturæ Herbarum Recentium? "These tinctures, when not otherwise directed, are to be prepared by the following formula:—

Take of By Measure.

The Fresh Herb, bruised or crushed, 500 grammes, or . . . 500 gm.

Alcohol, 1000 cubic centimeters, or . . . 1000 c.c.

"Macerate the Herb with the alcohol for fourteen days, then express the liquid and filter (50 per cent. fresh herb)."

VINA MEDICATA—MEDICATED WINES.

What are Vina Medicata, or Medicated Wines? Medicated Wines are liquid preparations containing the soluble principles of medicinal substances dissolved in Wine.

There are fourteen official wines. Four classes:—

1. NOT MEDICATED.—*Vinum Album*—"A pale, amber-colored or straw-colored, alcoholic liquid, made by fermenting the unmodified juice of the grape, freed from seeds, stems, and skins." *Rubrum*—"A deep red liquid, having a pleasant odor free from yeastiness, and a fruity, moderately astringent, pleasant, and slightly acidulous taste, without excessive sweetness or acidity. Made by fermenting the juice of colored grapes in presence of their skins. When White Wine is prescribed without further specification, the Pharmacopœia recommends that a dry White Wine of domestic productions (such as California Riesling, Ohio Catawba, etc.) be employed.

2. BY SOLUTION.—*Vinum Antimonii*—4 p. Tart. Emet.; 65 p. Boiling Dist. W.; 150 p. Alcohol; White Wine to 1000 p. *Ferri Amarum*—5 p. Sol. Cit. Iron and Quinine; 15 p. Tr. Aurant. Dulc.; 30 p. Syr.; White Wine to 100 p. *Ferri Citratis*—4 p. Cit. Iron and Ammon.; 15 p. Tr. Aurant. Dulc.; 10 p. Syr.; W. Wine to 100 p. *Ipecacuanha*—10 p. Ext. Ipecac. Fld.; 10 p. Alcohol; W. Wine to 100 p.

3. BY MACERATION.—*Colchici Seminis*—15 p. Colch. S. (20 Pow.); 15 p. Alcohol; W. W. to 100 p. *Opii*—10 p. Opium; 1 p. P. Cin.; 1 p. P. Cloves; 15 p. Alcohol; 85 p. W. W.; Macerate 7 ds.; filter, add W. W. to 100 p.

4. BY PERCOLATION.—*Vinum Aromaticum*—1 p. each Lav., Origan. Pep., Rosemary, Sage, and Wormwood; Percolate with Str. W. W. to 100 p. *Colchici Radicis*—40 p. Colch. R. (30 P.); Perc. with 15 p. Alcohol and 150 p. W. W. to 100 p. *Ergota*—15 p. Erg. (30 Powd.); Perc. with 15 p. Alcohol and 85 p. W. W. to 100 p.

EXTRACTA FLUIDA—FLUID EXTRACT.

What is a Fluid Extract? Fluid extracts are liquid alcoholic preparations of uniform and definite strength, made by percolating drugs with menstrua, and concentrating a portion of the percolate, so that in each case a cubic centimetre represents the medicinal virtue of one gramme of the drug; they are mostly concentrated tinctures.

What is the characteristic peculiarity of Fluid Extracts? One *minim* of fluid extract always represents one *grain* of the drug from which it is prepared.

What great advantages do they possess over tinctures? They are uniform, definite, and concentrated.

What advantages do tinctures possess over Fluid Extracts? 1st. In some cases the alcohol menstruum of the tincture is to be desired. 2d. Tinctures may be added in small proportions to aqueous preparations, without serious precipitation.

Give the five principal methods of preparing Fluid Extracts now in use. 1. Percolation with partial evaporation (official). 2. Percolation with incomplete exhaustion. 3. Repercolation (Squibb). 4. Maceration with hydraulic pressure (Parke, Davis & Co.). 5. Vacuum maceration with percolation (Duffield).*

Give a Typical Formula for an official Fluid Extract. "100 grammes of the powdered drug is moistened with a certain quantity of menstruum, packed in a suitable percolator, and enough menstruum added to saturate the powder and leave a stratum above it; the lower orifice of the percolator is closed when the liquid begins to drop, and the percolator is closely covered to prevent evaporation and permit maceration for a specified time; additional menstruum is poured on, and percolation continued until the drug is exhausted. Usually from seven to nine-tenths of the first portion of the percolate is reserved, and the remainder evaporated at a temperature not exceeding 50° C. (122° F.) to a soft extract; this is to be dissolved in the reserved portion, and enough menstruum added to make the fluid extract measure 100 c.c."—Remington.

Why is the latter portion of the percolate reserved and evaporated to a soft extract? The evaporation of the latter portion of the percolate permits concentration of the preparation without exposing the stronger portion to heat.

What is meant by Percolation with Incomplete Exhaustion? The modification of the official process is based upon the principle that the first seventy-five per cent. of the percolate contains seventy-five per cent. of drug. Acting under this assumption, the process is stopped here, and the fluid extract declared finished, and of full strength.

What is claimed in favor of this method? Saving of alcohol, and the use of heat. It is claimed that the wastage of alcohol comes from trying to recover the remaining 25 per cent. of the activity of the drug; and the use of heat is entirely obviated.

What is urged against the method? If percolation is properly con-

* For a full description of the process of Squibb, Parke, Davis & Co., and S. P. Duffield, illustrated with cuts of the apparatus employed, see Remington's "Practice of Pharmacy."

ducted, the first 75 per cent. of the percolate probably does contain 75 per cent., or more, of the desired portions of the drug. But the officinal process, by carrying the percolation to complete exhaustion, insures against want of care and skill in conducting the operation, as the remaining activities are secured by the continuance of the percolation and final concentration.

There are ninety-nine officinal fluid extracts, eleven classes:—

1. Menstruum Alcohol—(19): *Extractum Aromaticum*; *Buchu*; *Calami*; *Cannabis Indicæ*; *Capsici*; *Cimicifugæ*; *Cubebæ*; *Cusso* (*Kouso*); *Eriodictyi*; *Gelsemii*; *Grindeliæ*; *Iridis*; *Sabinæ*; *Xanthoxyli*; *Phytolacæ*; *Veratri Viridis*; *Lupulini*; *Mezerei*; *Zingiberis*.

2. Alcohol, 4; Water, 1—(3): *Belladonnæ Radicis*; *Podophylli*; *Rhei*.

3. Menstruum Alcohol, 3; Water, 1—(15): *Ipecacuanhæ*; *Aconiti*; *Calumbæ*; *Eucalypti*; *Grindeliæ*; *Guaranæ*; *Matico*; *Scillæ*; *Serpentariæ*; *Stramonii*; *Digitalis*; *Rhei*; *Nux Vomica* (5 per cent. Acetic Acid); *Podophylli*; *Leptandræ*.

4. Menstruum Alcohol, 2; Water, 1—(13): *Aurantii Amarî*; *Chiracæ*; *Menispermæ*; *Colchici Radicis*; *Colchici Seminis*; *Phytolacæ Radicis*; *Hyoscyami*; *Senegæ* (5 per cent. Am. H. O.); *Serpentariæ*; *Stramonii Seminis*; *Valerianæ*; *Viburni Opuli*; *Viburni Prunifolii*.

5. Menstruum Dil. Alcohol—(24): *Arnice Radicis*; *Asclepiadis*; *Aspidospermatis*; *Chimaphilæ*; *Cocæ*; *Gentianæ*; *Conii* (menstruum containing 2 per cent. official acetic acid); *Convallariæ*; *Cypripedii*; *Dulcamariæ*; *Ergotæ* (menstruum with 2 per cent. acetic acid); *Rumicis*; *Sanguinariæ* (menstruum containing 5 per cent. acetic acid); *Scoparii*; *Scutellariæ*; *Sennæ*; *Taraxaci*; *Spigeliæ*; *Stillingiæ*; *Lappa Pilecarpi*; *Erythroxylî*; *Lobeliæ*; *Eupatorii*.

6. Menstruum containing Glycerin—(17): *Apocyni*; *Castanæ*; *Cinchonæ*; *Hamamelidis*; *Hydrastis*; *Krameriæ*; *Rosæ*; *Rubi*; *Gossypii*; *Geranii*; *Uvæ Ursi*; *Chiracæ*; *Pruni Virginianæ*; *Sarsaparillæ Compositum*; *Rhus Glabræ*; *Paviræ*; *Cinchonæ*.

7. Menstruum Alcohol, 3; Water, 4—(1): *Senne*.

8. Menstruum Alcohol, 5; Water, 8—(1): *Frangulæ*.

9. Menstruum Alcohol, 30; Water, 65—(1): *Glycyrrhizæ*.

10. Menstruum Alcohol, 1; Water, 2—(3): *Frangulæ*; *Quassie*; *Sarsaparillæ*.

11. Menstruum Boiling Water—(2): *Aloes*; *Tritici*.

ETHEREAL LIQUIDS MADE BY PERCOLATION.

OLEORESINÆ—OLEORESINS.

What are Oleoresinæ, or Oleoresins? The oleoresins are officinal liquid preparations, consisting principally of natural oils and resins extracted from vegetable substances by percolation with stronger ether. They are the strongest liquid preparations of drugs produced.

Give a general formula for their preparation. Percolate the powdered drug, in a cylindrical percolator provided with a cover and receptacle suitable for volatile liquids, with stronger ether, until exhausted, recovering the greater part of the ether by distillation, and exposing the residue, in a capsule, to spontaneous evaporation until the remaining ether has evaporated.

There are six officinal oleoresins :—

Oleoresina Aspidii—yield 10 to 15 per cent. ; *Capsici*—yield 5 per cent. ; *Cubebæ*—yield 18 to 25 per cent. ; *Lupulini*—yield 50 per cent. ; *Piperis*—yield 5 per cent. ; *Zingiberis*—yield 6 to 8 per cent.

ACETOUS LIQUIDS MADE BY PERCOLATION.

ACETA—VINEGARS.

What are Aceta, or Vinegars ? Medicated vinegars are solutions of the active principles of drugs in diluted acetic acid, the latter being chosen as a menstruum because acetic acid is not only a good solvent, but also possesses antiseptic properties. Their use dates from the time of Hippocrates.

What menstruum is used for their preparation ? Acetic Acid, 1 p. ; water, 7 p. Acetic Acid is of value as a menstruum, as it produces soluble salts with the alkaloidal principles existing in plants.

There are two officinal vinegars :—

Acetum Opii—10 p. Powd. Opium ; 3 p. Powd. Nutmeg ; 20 p. Sugar ; percolate with Dil. Acetic Acid to 100 p. *Scillæ*—10 p. Squill. (30 powd.) ; percolate with Dil. Acetic Acid to 100 p.

SOLIDS.

SOLID PREPARATIONS MADE BY PERCOLATION OR MACERATION.

EXTRACTA—EXTRACTS.

What are Extracta, or Extracts ? “ Extracts are solid or semi-solid preparations, produced by evaporating solutions of vegetable substances.” —(Remington.)

There are thirty-nine officinal extracts :—

1. WITH ALCOHOLIC MENSTRUUA (19).

General Formula.—“ Percolate the powdered drug with the menstruum directed, until it is exhausted ; reserve the first third of the percolate, and evaporate the remainder, at a temperature not exceeding 50° C. (122° F.), until it weighs 10 per cent. of the weight of the drug. Mix this with the reserved portion, and evaporate both, at the above temperature, to a pilular consistence. Or, instead of reserving part of the percolate, the whole quantity is distilled until the alcohol is recovered, and the residue is evaporated to a pilular consistence. In the case of these extracts, which are apt to become hard, five per cent. of glycerin is added, to enable them to retain their consistence.”

Directions for making Extract of Aconite, as directed by the U. S. Pharmacopœia, illustrating the method for manufacturing this class of extracts :—

Extractum Aconiti—Extract of Aconite.

Aconite, in No. 60 powder, 1000

grammes, 1000 grammes.

Alcohol, a sufficient quantity.

Moisten the powder with *four hundred* (400) cubic centimetres of alcohol, and pack it firmly in a cylindrical percolator; then add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed, gradually adding alcohol until three thousand cubic centimetres (3000) of tincture are obtained, or the aconite is exhausted. Reserve the first *nine hundred* cubic centimetres of the percolate, evaporate the remainder in a porcelain capsule, at a temperature not exceeding 50° C. (122 F.), to *one hundred* cubic centimetres, add the reserved portion, and evaporate at or below the above-mentioned temperature, until an extract of pilular consistency remains.

Sub-class 1.—Menstruum, alcohol, (7) *Extractum Aconiti*; *Cimicifugæ*; *Tridis*; *Jalapæ*; *Physostigmatis*; *Cannabis Indicæ*; *Juglandis*.

Sub-class 2.—Menstruum, alcohol, 4; water, 1 (2)—*Podophylli*; *Rhei*.

Sub-class 3.—Menstruum, alcohol, 2; water, 5—*Uvæ Ursi*.

Sub-class 4.—Menstruum, alcohol, 3; water, 1—(5) *Extractum Cinchonæ*; *Leptandræ*; *Nucis Vomica* (5 per cent. HC_2H_3) or *Podophylli*; *Rhei*.

Sub-class 5.—Menstruum, alcohol, 2; water, 1—(5) *Extractum Belladonnæ foliorum Alcoholicum* (leaves); *Euonymi*; *Hyoscyami*; *Digitalis*; *Leptandrinæ*.

Sub-class 6.—Menstruum, diluted alcohol—(7) *Extractum Arnice Radicis*; *Conii*, menstruum, containing 2 per cent. official Acetic Acid (fruit); *Ergotæ*; *Euonymi*; *Juglandis*; *Stramonii Seminis*; *Colocynthis* (fruit from seeds).

Sub-class 7.—Menstruum, alcohol, 2; water, 4—(1) *Extractum Ergotæ*.

2. MADE WITH AQUEOUS MENSTRA (10): *Extractum Aloes*; *Hematoxylæ*; *Opii*; *Taraxaci*; *Gentianæ*; *Glycyrrhizæ Purum* (water containing 15 per cent. water of Ammonia to dissolve Glycyrrhizin); *Krameria*; *Quassia*; *Colchici Radicis* (water containing 23.3 per cent. of official Acetic Acid); *Glycyrrhizæ*.

3. COMPOUND EXTRACTS.—*Extractum Colocynthis Compositum*—Ext. Col., 16 per cent.; Aloes, 50 per cent.; Card., 6 per cent.; Scam., 14 per cent.; Soap, 14 per cent.; Alcohol, 10 per cent. of the combined weight of the other ingredients.

Why does the pharmacopœia direct that 10 per cent. of glycerin be added to certain extracts? To preserve them in a plastic condition for making pills, etc.

RESINÆ—RESINS.

What are Resinæ, or Resins? The official resins are solid preparations, consisting principally of the resinous principles from vegetable bodies, prepared by precipitating them from their alcoholic solution with water.

There are four official resins:—

Resina Copaibæ (left after distilling off volatile oil); *Jalapæ* (pouring a tincture into water); *Podophylli* (pouring a tincture into water acidulated

with HCl); *Scammonii* (pouring a tincture, made by digesting Scammony in boiling alcohol, into water).

SOLID PREPARATIONS MADE WITHOUT PERCOLATION OR MACERATION.

PULVERES—POWDERS.

There are nine official powders:—

Pulvis Antimonialis—Antimonial Powder [James' Powder]—Ox. Ant. 33 p.; Precip. Phos. Calc. 67 p. = 100 p. *Aromaticus*—Cin. 35 p.; Ginger 35 p.; Card. 15 p.; Nutmeg 15 p. = 100 p. *Cretæ Compositus*—Prep. Chalk 30 p.; Acacia 20 p.; Sugar 50 p. = 100 p. *Effervescens Compositus* [Seidlitz Powder]—Sod. Bicarb. 31 gms.; Roch. Salts 93 gms.; Tart. Acid 27 gms.; mix Sod. Bicarb. and Roch. Salts; divide into 12 equal parts—blue papers; divide acid in 12 equal parts—white papers. *Glycyrrhizæ Compositus*—Senna 18 p.; Glycyrr. 23.6 p.; Fennel .4 p.; W. Sulphur 8 p.; Sugar 50 p. = 100 p. *Ipecacuanhæ et Opii* [Dover's Powder]—Ipecac. Opium, each 10 p.; Sacch. Lac. 80 p. = 100 p. *Jalapæ Compositus*—Jalap 35 p.; Cream Tart. 65 p. = 100 p. *Morphinæ Compositus* [Tully's Powder]—Sulphate of Morphia 1 p.; Camph. 19 p.; Glycyrr. 20 p.; Calc. Carb. Precip. 20 p.; Alcohol q. s. to powder the camphor. *Rhei Compositus*—Rhub. 25 p.; Magnesia 65 p.; Ginger 10 p. = 100 p.

TRITURATIONES—TRITURATIONS.

What are Triturationes, or Triturations? A new class of powders introduced into the U. S. P. of 1830, for the purpose of fixing a definite relation between the active ingredient and the diluent.

Give a general formula for their preparation, as directed by the U. S. P.

Take of—

Definite Formula.

The Substance, 10 grammes, 10 gm.

Sugar of Milk, in moderately fine powder, 90 grammes, 90 gm.

To make 100 grammes, 100 gm.

Weigh the Substance and Sugar of Milk separately; then place the Substance, previously reduced, if necessary, to a moderately fine powder, in a mortar; add an equal bulk of Sugar of Milk, mix well by means of a spatula, and triturate them thoroughly together. Add fresh portions of the Sugar of Milk, from time to time, until the whole is added, and continue the trituration until the Substance is intimately mixed with the Sugar of Milk, and finely comminuted.

There is one official trituration:—

Trituratio Elaterina—Elaterin 10 gms.; Sug. Milk 90 gms. = 100 gms.

MASSÆ—MASSES.

What are Massæ, or Masses? Pill masses are official under this name. They are kept in bulk by pharmacists.

There are three official masses:—

Massa Copaiba—94 p. Cop.; 6 p. Mag. (recently prepared); mix intimately and set aside until it concretes. *Ferri Carbonatis*—100 p. Sulph. Iron; 100 p. Carb. Sod.; 38 p. Clarif. Honey; 25 p. Sugar; syrup and distilled water, each q. s. Dissolve Sulph. Iron and Carb. Sod., separately, in boiling distilled water; add 20 p. Syrup to former; mix solutions. When cold, pour off supernatant liquid, and wash precipitate with 1 p. syrup and 19 p. water. Drain, and mix with honey and sugar, and evaporate to 100 p. *Hydrargyri*—33 p. Hg; 5 p. Glycerin; 25 p. Althæa; 3 p. Glycerin; Honey of Rose 34 p.; triturate till Hg is extinguished. Add, gradually, Glycyrrhizæ 5 p.; Althæa 25 p.; continue trituration till globules of Hg cease to be visible.

CONFECTIONES—CONFECTIONS.

What are Confectiones, or Confections? Confections are saccharine, soft solids, in which one or more medicinal substances are incorporated, with the object of affording an agreeable form for their administration and a convenient method for their preservation. Old names, *conserves* and *electuaries*, under which they have been in use for centuries.

There are two official confections:—

Confectio Rosæ—R. Rose 8 p.; P. Sugar 64 p.; Clar. Honey 12 p.; Rose W. 16 p. *Senne*—Sen. 10 p.; Ol. Coriander .5 p.; Cas. Pist. 16 p.; Tamarind 10 p.; Prune 7 p.; Fig 12 p.; P. Sug. 55.5 p.; Water to make 100 p.

PILULÆ—PILLS.

What are Pilulæ, or Pills? "Pills are small, solid bodies, of a globular, ovoid, or lenticular shape, which are intended to be swallowed, and thereby produce medical action."—(Remington.)

Of what is a pill mass composed, and what is required of it? It is composed of ingredients and excipients. It is required that the mass be 1, *adhesive*; 2, *firm*; 3, *plastic*.

How are excipients divided? and give a list of the principal excipients and directions when they should be used. Excipients are liquid or solid.

LIQUID EXCIPIENTS.

1. Water: use only when ingredients possess inherent adhesiveness that water will develop.

2. Syrup: adhesive.

3. Syrup Acacia: more adhesive.

4. Macillage Acacia: most adhesive. Pills are liable to become hard and insoluble if acacia in any form is used as excipient.

5. Glycerin: somewhat adhesive. It is hygroscopic and keeps pills soft.

6. Glucose: very adhesive. Colorless, and non-volatile at ordinary temperatures. Very valuable.

7. Honey: Good substitute for glucose, but colors white pills.

8. Extract of Malt: advantages of glucose, but disadvantage (color) of honey.

9. Glycerite of Starch: Glycerin—adhesiveness of starch and jelly. Thickness sometimes an objectionable feature.

10. Glycerite of Tragacanth: Similar to above.

11. Remington's general excipient: Glucose 4 oz. av.; Glycerin 1 oz. av.; Acacia (pulv.) 90 grains; Benzoic Acid 1 grain. Dissolve benzoic acid in the glycerin, stir in acacia, then the glucose, and let stand till dissolved. *Moderate* heat may be used.

SOLID EXCIPIENTS.

1. Confection of Rose: Useful when it is desired to dilute active ingredients and increase bulk.

2. Bread Crumb: Used in making pills to contain croton oil, volatile oils, etc.

3. Powdered Althæa: too bulky for ordinary use.

4. Soap: valuable for resinous substances. Not only makes excellent mass, but increases the solubility of resins.

5. Resin Cerate: for oxidizable substances, resins, etc.

6. Cacao Butter: for pills of permanganate of potassium, etc.

7. Petrolatum: for oxidizable substances as above.

How would you divide the mass? On a graduated pill tile, or a pill machine. The former is made of porcelain, but preferably of plate glass. In either case the pill-mass is rolled into a cylinder. In the former the mass is divided into the required number of portions with a spatula. In the latter it is divided by laying it upon the grooves of the lower board in the pill machine; the upper board is applied so that the cutting surfaces correspond with those on the lower board, and "by a slight backward and forward motion, with downward pressure, the mass is divided."

How would you finish pills and keep them from adhering together? Finish them either by rolling between the thumb and finger, or rotate them under an adjustable pill finisher. To prevent them from adhering together, dust with rice flour, powdered magnesium carbonate, lycopodium, powdered althæa, or powdered licorice root.

How may pills be coated? Pills may be coated with various substances. With *gold* or *silver*, "by first placing a drop of syrup of acacia in a mortar, and after carefully spreading it over the surface with the end of the finger, dropping in the pills, rotating them so that they shall be uniformly coated with a very thin layer of mucilage, and then dropping them into the gold or silver leaf contained in the coater"—"a smooth, globular box, opening in the middle." An ordinary pill box will answer the purpose. With *gelatin*, by a simply constructed machine, in which the pills, arranged automatically in rows, are impaled on a system of pins, afterward dipped in a hot solution of gelatin, twirled gently until the coating is set, and rapidly dried by rotating on a wheel, after which they are removed from the pins. This can be accomplished in fifteen minutes. With *sugar*, by rotating them with a mixture of sugar and starch in a pill coater, which consists of a caldron-shaped copper vessel, revolving at an incline, and heated by steam. The process can only be accomplished economically on the large scale.

How are compressed pills manufactured? On the small scale, by Remington's compressed pill machine. It is made of cast steel, has at the base two counter sunk depressions, with a short post in the centre of each, the posts with a lenticular depression on their upper surfaces, two steel

cylinders fitting over the posts, plungers that fit in the cylinders with lenticular depressions to correspond with those on the posts. The powder is compressed into pills between the lenticular surfaces by blows on the plungers with a mallet, and are removed by lifting the cylinders. On the large scale by power presses, working on a similar principle.

There are fifteen official pills:—

Pilule Aloes—Aloes and Soap each 13 gm. in 100 pills. *Aloes et Asafetide*—9 gm. each Aloes, Asafetida, and Soap, in 100 pills. *Aloes et Ferri*—7 gm. each Aloes, Dried Sulph. Iron, and Aromat. Powder, q. s. Confect. Rose in 100 pills. *Aloes et Mastiches* [Aloes and Mastic—Lady Webster Dinner Pills]—13 gm. Aloes, 4 gm. Mastic, 3 gm. Red Rose in 100 pills. *Aloes et Myrrha*—13 gm. Aloes, 6 gm. Myrrh, 4 gm. Aromat. Powd., q. s. Syrup, 100 Pills. *Antimonii Compositæ* [Plummer's Pills]—4 gm. Sulphurated Ant., 4 gm. Calomel, 8 gm. Guaiac., q. s. Castor Oil, 100 pills. *Asafetide*—20 gm. As., 6 gm. Soap, 100 pills. *Cathartica Compositæ*—80 gm. Ext. Col. Comp., 60 gm. Calomel, 30 gm. Jalap (extract), 15 gm. Gamboge, 1000 pills. *Cathartica Vegetabilis*—60 gm. Ext. Col. Comp., 30 gm. Ext. Hyoscyam., 30 gm. Ext. Jalap, 15 gm. Ext. Leptandra, 15 gm. Resin Podophyllum, 8 c.c. Oil of Peppermint, in 1000 pills. *Ferri Carbonatis* [Ferruginous Pills, Chalybeate Pills, Bland's Pills]—16 gm. Ferrous Sulphate, 8 gm. Potass. Carb., 4 gm. Sugar, 1 gm. Tragacanth, 1 gm. Athea, q. s. Glycerin, in 100 pills. *Ferri Iodidi*—Reduced Iron 4 gm., Iodine 5 gm., P. Glycyrr. 4 gm., Sugar 4 gm., Ext. Glycyrr. 1 gm., Acacia 1 gm.; q. s. each Water, Bals. Tolu, and Ether. (For process, see U. S. P.) *Opii*—6.5 gm. Opium, 2.0 gm. Soap, 100 pills. *Phosphori*—0.06 gm. Phos., 6.00 gm. Althæa, 6.00 gm. Acaciæ: Phosphorus dissolved in 5 c.c. Chloroform, and made into a pill with about 4 c.c. of a mixture of 2 vol. Glycerin, 1 vol. Water. Coated with 10 gm. Bals. Tolu dissolved in 15 c.c. Ether. *Rhei*—20 gm. Rhubarb and 6 gm. Soap in 100 pills. *Rhei Compositæ*—13 gm. Rhubarb, 10 gm. Aloes, 6 gm. Myrrh, 0.5 gm. Ol. Pep. in 100 pills.

TROCHISCI—TROCHES.

What are Trochisci, or Troches? Troches, or lozenges, are solid, discoid, or cylindrical masses, consisting chiefly of medicinal powders, sugar, and mucilage. They are prepared by making the ingredients into a mass which is rolled into a thin sheet, and cut into proper shape with a lozenge cutter.

As lozenges are generally made only on the large scale, and by machinery, merely naming them is sufficient.

There are fifteen official lozenges:—

Trochisci Acidi Tannici; *Ammonii Chloridi*; *Catechu*; *Creta*; *Cubebæ*; *Ferri*; *Glycyrrhizæ et Opii* ($\frac{1}{10}$ gr. ext. opium in each); *Ipecacuanhæ*; *Kramerizæ*; *Menthæ Piperitæ*; *Morphinæ et Ipecacuanhæ* ($\frac{1}{10}$ gr. Sulph. Morph. in each); *Potassii Chloratis*; *Santonini* (1 gr. Sant. Sod. in each); *Sodii Bicarbonatis*; *Zingiberis*.

SOLID PREPARATIONS FOR EXTERNAL USE.

CERATA—CERATES.

What are Cerata, or Cerates? Cerates are unctuous substances of such consistency that they may be easily spread, at ordinary temperatures,

upon muslin or similar material, with a spatula, and yet not so soft as to liquefy and run when applied to the skin.

Why are they called cerates? Owing to the presence of wax (Cera).

What substances are used for bases? Oil, lard, petrolatum. Wax, and sometimes paraffin or spermaceti, in the presence of wax, are used to raise the melting point of the bases.

There are six official cerates. Two classes:—

1. OFFICIAL CERATES BY FUSION (4).—*Ceratum*—30 p. W. Wax; 70 p. Lard: Fuse, and stir till cold. *Ceratum Cantharidis*—Yel. Wax 18 p.; Resin 18 p.; Lard 22 p.; Canthar. 32 p.; Oil of Turpentine 15 p.: Digest half an hour; stir till cold. *Cetacei*—Sperm 10 p.; W. Wax 35 p.; Olive Oil 55 p.: Fuse, and stir till cold. *Resine*—Resin 35 p.; Yel. Wax 15 p.; Lard 50 p.: Fuse; strain; cool.

2. OFFICIAL CERATES BY INCORPORATION (2).—*Ceratum Camphoræ*—Mix Camph. Lin. 10 p.; White Wax 30 p.; Lard 60 p. *Plumbi Subacetatis*—Incorporate 20 p. Sol. Subacet. Pb. into 80 p. Camph. Cerate.

UNGUENTA—OINTMENTS.

What are Unguenta, or Ointments? Ointments are fatty preparations, of a softer consistence than cerates, intended to be applied to the skin by inunction.

There are twenty-seven official ointments (three classes):—

1. OFFICIAL OINTMENTS BY FUSION (5).—*Unguentum*—Lard 80 p.; Yel. Wax 20 p. *Aque Rose*—Ol. Almonds 60 p.; Sperm. 12.5 p.; W. Wax 12 p.; Stronger Rose Water 19 p.; P. Sod. Bor. .5 p. *Diachylon*—Lead Plaster 50 p.; Olive Oil 49 p.: Cool; add Ol. Lav. 1 p.; stir till cold. *Picis Liquidae*—Yel. Wax 12.5 p.; Lard 37.5 p.: Fuse Lard and Wax; add Tar 50 p.; strain; stir till cold.

2. OFFICIAL OINTMENTS BY INCORPORATION (21).—*Unguentum Acidi Carbolici*—5 p. Acid; 95 p. Ointment. *Acidi Tannici*—20 p. Acid; 80 p. Benz. Lard. *Belladonnæ*—10 p. Alch. Ext. Bellad.; 5 p. Dil. Alcohol (rub till soft); 85 p. Benz. Lard. *Chrysarobini*—5 p. Chrys.; 95 p. Benz. Lard. *Gallæ*—20 p. Galls; 80 p. Benz. Lard. *Hydrargyri*—50 p. Hg; Oleate of Mercury 2 p.: Triturate until globules Hg no longer visible; add 25 p. Lard and 23 p. Suet, previously melted together and partially cooled. Triturate till globules of Hg cease to be visible under 10 diameters. *Hydrargyri Ammoniati*—10 p. Ammon. Hg; 90 p. Benz. Lard. *Hydrargyri Oxidi Flavæ*—10 p. Y. Ox. Hg; 90 p. Ointment. *Hydrargyri Oxidi Rubri*—10 p. Red Ox., Hg; Castor Oil 5 p.; 85 p. Ointment. *Iodi*—4 p. Iodine; 1 p. KI; 2 p. Water; 93 p. Benz. Lard. *Iodoformi*—10 p. Iodoform; 90 p. Benz. Lard. *Plumbi Carbonatis*—10 p. Carb. Pb; 90 p. Benz. Lard. *Plumbi Iodidi*—10 p. Iodide Lead; 90 p. Benz. Lard. *Potassii Iodidi*—12 p. KI; 1 p. Hyposulph. Sodium; 10 p. Boiling W.; Warm Mortar; 77 p. Benz. Lard. *Stramonii*—10 p. Ext. Stram.; 5 p. Dil. Al.; rub till soft; 85 p. Benz. Lard. *Sulphuris*—30 p. W. Sulph.; 70 p. Benz. Lard. *Veratrinæ*—4 p. Veratrine; Olive Oil, 6 p.; rub; 90 p. Benz. Lard. *Zinci Oxidi*—20 p. Ox. Zn.; Benz. Lard to 100 p.

3. OFFICIAL OINTMENTS BY CHEMICAL REACTION (1).—*Unguentum*

Hydrargyri Nitrat [Citrine Ointment]—Mercury 7 p.; Nitric Acid 17.5 p.; Lard Oil 76 p. Heat the lard oil, in a glass or porcelain dish, to 100° C. (212° F.); add, without stirring, 7 p. Nit. Acid; heat till effervescence discontinues; cool. Dissolve 11g in remaining acid, with q. s. heat; add to above. The olein of the oil is converted into elaidin, through the action of heat and nitric acid; solution of mercuric nitrate is then incorporated with the elaidin base.

EMPLASTRA—PLASTERS.

What are Emplastra, or Plasters? Plasters are substances intended for external application, of such consistence that they adhere to the skin, and require the aid of heat in spreading them.

On what are plasters usually spread? Plasters are usually spread on muslin, leather, paper, etc., and have as a basis, lead plaster, a gum-resin, or Burgundy pitch.

As plasters are usually bought of the manufacturer, ready-made, a description of the process for spreading them is omitted.

There are seventeen official plasters. Four classes:—

1. BASIS, GUM-RESIN (1).—*Emplastrum Ammoniaci cum Hydrargyro*—8 p. oleate mercury; stir; triturate in 180 p. 11g; emulsionize 720 p. Ammoniac in 1000 p. Dil. Acet. Acid by digesting, and add; lastly, add q. s. Lead Plaster to 1000 parts.

2. BASIS, LEAD OR RESIN PLASTER (8).—*Emplastrum Arnice*—33 p. Ext. Ar. Root; 67 p. Res. Plaster. Melt latter, and incorporate former with it. *Belladonnæ*—Al. Ex. Bel. Leaves, 20 p.; Resin Plaster, 40 p.; Soap Plaster, 40 p. Melt the plasters on a water-bath; add Ext.; stir. *Ferri*—72 p. Lead Plaster; 5 p. Olive Oil; 14 p. Burgundy Pitch; melt; add 9 p. Hyd. Ox. Iron; stir till cool. *Hydrargyri*—Triturate 30 p. Mercury with 1.2 oleate mercury; in tared capsule, then add q. s. lead plaster, previously warmed, to make 100 p.; mix. *Opi*—Rub 6 p. Ext. Opium; 8 p. Water, until soft; add 18 p. Burg. Pitch, 76 p. Lead Plaster, previously melted; heat, and stir to proper consistency. *Plumbi*—Rub, gradually, 32 p. Ox. Pb. with 60 p. Olive Oil; add 10 p. Water; boil; adding, cautiously, water from time to time, as it is consumed. *Resinæ*—80 p. Lead Plaster; 6 p. Y. Wax; melt; add Resin 14 p.; mix thoroughly. *Saponis*—10 p. Soap; q. s. water to soft mass; melt 90 p. Lead Plaster; mix.

3. BASIS, BURGUNDY OR CANADA PITCH (2).—*Emplastrum Picis Burgundicæ*—80 p. B. Pitch; 5 p. Olive Oil; 15 p. Y. Wax. *Picis cum Cantharidatum*—8 p. Cerate Canthar.; melt at 212° F.; strain; add 92 p. Burg. Pitch. Melt together and stir.

4. OFFICIAL SPREAD PLASTERS (2).—*Emplastrum Capsici*—Spread a thin layer of melted resin plaster on muslin, then apply a thin coating of oleoresin capsicum. *Ichthyocolle*—Dissolve 10 p. Isinglass in q. s. hot water to 120 p.; spread half on the taffeta with a brush; add 1 p. Glycerin, 40 p. Alcohol to remainder; apply in same manner; coat reverse side with Tr. Benzoin, and dry.

CHARTA—PAPERS.

What are Charta, or Papers? Papers are a small class of preparations intended for external application, made either by saturating paper with

medicinal substances, or by applying the latter to the surface of the paper by the addition of some adhesive liquid.

There are three official papers:—

Charta Potassii Nitratis—Nit. Potas. 20 p.; Dist. Water 80 p. Immerse strips of white, unsized paper in the solution, and dry them. *Charta Sinapis*—Black Mustard, 100 gm.; India Rubber, 10 gm.; Benzine, Carbon Disulphide, of each q. s. Percolate Mustard with Benzine, to rid it of fixed oil; dry. Dissolve India Rubber in mixture of 100 c. c. each, Benzin and Carbon Disulphide; make semi-liquid magma with mustard. Brush on rather stiff, well-sized paper. Each 60 sq. cent. of paper should contain about 4 gm. mustard.

SUPPOSITARIA—SUPPOSITORIES.

What are Suppositories? Suppositories are solid bodies intended to be introduced into the rectum, urethra, or vagina, to produce medicinal action.

What are the requirements in preparing them? They should be prepared of materials of sufficient consistency to retain their shape when inserted, and, at the same time, melt at the temperature of the body. Butter of cacao fulfils the requirements. Only in the hottest summer weather should its melting point be raised by the addition of spermaceti or wax, unless some softening ingredient is used in making the suppositories.

How are Gelatin Suppositories prepared? Gelatin suppositories are made from a mass containing gelatin and glycerin, by soaking gelatin in water, draining off the excess, adding five parts, by weight, of glycerin to every twelve parts of soft gelatin, and heating in a water-bath. The medicating substance is rubbed into a smooth paste with a small quantity of water or glycerin, and added to the mass.

By what three methods are Suppositories shaped? By *rolling*, *moulding*, and *pressing*.

Describe the method for performing each operation.

1. *Rolled Suppositories* are made by incorporating the medicinal substance with grated cacao butter, in a mortar, with a pestle, until the mixture becomes a mass. The mass is now rolled into a cylinder on a pill tile, thoroughly dusted with lycopodium, and cut into the desired lengths, which are then made into a conical form by rolling one end on the tile with a spatula, so as to produce a rounded point.

2. *Moulded Suppositories*.—The U. S. P. directs that they shall be made in the following manner: Mix the medicinal portion (previously brought to a proper consistence, if necessary) with a small quantity of Oil of Theobroma, by rubbing them together, and add the mixture to the remaining Oil of Theobroma, previously melted and cooled to the temperature of 35° C. (95° F.). Then mix thoroughly, without applying more heat, and immediately pour the mixture into suitable moulds. The moulds must be kept cold by being placed on ice. In the absence of suitable moulds, suppositories may be formed by allowing the mixture, prepared as above, to cool, care being taken to keep the ingredients well mixed, and dividing into parts of a definite weight each, which may be made into a conical or other convenient form for a suppository.

What weights and shapes are directed by the U. S. P.? Unless otherwise specified, suppositories should have the following weights and shapes, corresponding to their several uses:—

Rectal suppositories should be cone shaped, and of a weight of about 1 gramme.

Urethral suppositories should be pencil-shaped, and of a weight of about 1 gramme.

Vaginal suppositories should be globular, and of a weight of about 3 grammes.

3 *Pressing*.—This is usually accomplished by pressing the mass through a cylinder into a mould, without heat. Unsatisfactory.

How many Suppositories are officinal in the U. S. P.? One, Suppositoria Glycerini.

Give Formula and Directions for making it. Take of Glycerin, 60 gm.; of Sodium Carbonate, 3 gm.; Stearic Acid, 5 gm. to make 10 rectal suppositories. Dissolve the Sodium Carbonate in the Glycerin in a capsule on a water-bath, then add the stearic acid, and heat carefully until this is dissolved, and the escape of carbonic acid gas has ceased. Then pour the mass into suitable moulds, remove the suppositories when they are cold, and wrap each in tin-foil.

Into what three classes are suppository moulds divided? * Into : 1. Individual moulds. 2. Divided moulds. 3. Hinged moulds.

What are Suppository Capsules? * Dr. F. E. Stewart has suggested the employment of gelatin shells, with conical caps, to be used as suppositories. The medicating ingredients are inserted in the lower portion; the upper margin is then moistened with water, and the cap inserted. Before introducing them into the rectum, they should be wet with sufficient water to enable them to slip in easily."

What are Urethral Suppositories, or Bougies? They are suppositories usually made of gelatin, in the form of bougies, and used to medicate the mucous surface of the urethra. They may be prepared by melting together 3 p. gelatin, 1 p. glycerin, 1 p. distilled water (by weight), adding the desired medicament, and moulding into cylinders in a well-oiled glass tube, afterward cutting the cylinders into the desired lengths.

* For excellent descriptions of the various forms of suppository moulds, see Remington's "Practice of Pharmacy."

PART III.

THE PREPARATIONS OF THE INORGANIC MATERIA MEDICA.

HYDROGEN, OXYGEN, AND WATER.

H; 1. O; 16. H_2O ; 18.

Hydrogen and oxygen are colorless, odorless gases, of no special interest pharmaceutically, except that they combine to form water, which is of the greatest importance in pharmacy. Hydrogen is also unity for quantivalence and atomic weight.

H is combustible; O aids combustion.

AQUA, U. S.—Water.—A colorless, limpid liquid, without odor and taste at ordinary temperatures, and remaining odorless while being heated to boiling, of a perfectly neutral reaction, and containing not more than 1 part of fixed impurities in 10,000 parts.

AQUA DESTILLATA, U. S.—Distilled Water.—A colorless, limpid liquid, without odor or taste, and of a neutral reaction. On evaporating one litre, no fixed residue should remain.

In pharmacy water is used principally as a solvent.

THE INORGANIC ACIDS.

Acids are distinguished from other bodies by THREE PROPERTIES. 1. They all contain hydrogen, and are sometimes called hydrogen salts. The hydrogen is capable of being replaced by metals. 2. Those which are soluble in water have a characteristic, sour taste, and corrosive action. 3. They act on litmus and other vegetable substances, changing their color.

The inorganic acids may be divided into three classes:—1st. *Hydrides*, or those not containing O, derived from non-metallic elements. Ex., HCl, HBr. 2d. The O acids from non-metallic elements. Ex., HNO_3 , H_2SO_4 , H_2SO_3 , etc. 3d. *Anhydrides*, from metallic elements. This class includes Arsenious Acid, Chromic Acid, and the weak acid from Boron.

The suffixes "ous" and "ic," are used as terminations to the names of acids containing O; the former denoting a lower proportion of O, the latter a higher amount. Ex., Sulphurous acid, H_2SO_3 , contains less O than sulphuric acid, H_2SO_4 .

The officinal inorganic acids are mostly solutions of gases in water, the amount of gas in solution varying in the stronger acids; but the officinal class, known as *diluted acids*, are intended to be uniform.

Medical Properties.—Tonic and refrigerant in the dilute form; caustic and corrosive poisons when strong.

Antidotes.—Large amounts of *mild* alkalis administered with some bland, fixed oil. (Soap, carbonate or bicarbonate of sodium, dissolved in water; after which, draughts of oil.)

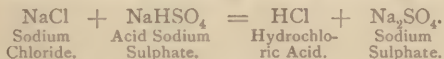
ACIDUM HYDROCHLORICUM, U. S.—Hydrochloric Acid. Muriatic Acid. HCl .—A colorless, fuming liquid, composed of 31.9 per cent. absolute HCl and 68.1 per cent. water, with a specific gravity 1.16; pungent, suffocating odor; intensely acid taste; strongly acid reaction.

Preparation.—Principally as a by-product in the manufacture of soda-ash, by decomposing NaCl at a high temperature with H_2SO_4 . The process has two steps:—

1st Step.—Decomposition of half of the NaCl .



2d Step.—Decomposition remaining NaCl at 220°C . (425°F .), or over.



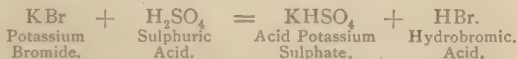
The yellow color in common hydrochloric acid is due to organic substances or a trace of iron.

ACIDUM HYDROCHLORICUM DILUTUM, U. S.—Diluted Hydrochloric Acid.—A colorless liquid, containing 10 per cent., by weight, of absolute HCl , and prepared by diluting 6 p. Hydrochloric Acid with 13 p. Distilled Water. Specific gravity 1.049; odorless; strongly acid taste; acid reaction.

ACIDUM HYDROBROMICUM DILUTUM, U. S.—Diluted Hydrobromic Acid. HBr .—A clear, colorless liquid, composed of 10 per cent. absolute HBr and 90 per cent. water. Specific gravity 1.077; odorless; strongly acid taste; acid reaction.

Preparation.—Two methods—1st, distillation; 2d, double decomposition and precipitation.

1st Method (distillation).—Decompose potassium bromide with sulphuric acid. This forms acid potassium sulphate (crystals) and hydrobromic acid (liquid). Separate the liquid HBr from the crystals and distill it in a retort nearly to dryness, then add q. s. distilled water to make the product contain 10 per cent. actual HBr .



2d Method (precipitation).—Add tartaric acid to a solution of potassium bromide (400 gr. acid to 340 gr. bromide in 4 fl. oz. water). Tartrate of potassium precipitates and HBr remains in solution.

ACIDUM HYPOPHOSPHOROSUM DILUTUM, U. S.—Diluted Hypophosphorous Acid.—A liquid composed of about 10 per cent. by weight of absolute hypophosphorous Acid [$\text{H}_3\text{P}_2\text{O}_5$ 65.88], and about 90 per cent. of water. A colorless liquid, without odor, and

having an acid taste. Sp. gr. about 1.046 at 15° C. (59° F.). Miscible, in all proportions, with water.

ACIDUM NITRICUM, U. S.—Nitric Acid. HNO_3 . *Aqua Fortis*.—A colorless, fuming, very caustic and corrosive liquid, composed of 69.4 per cent. absolute HNO_3 and 30.6 per cent. Water; sp. gr. 1.42; peculiar, somewhat suffocating odor; strongly acid reaction.

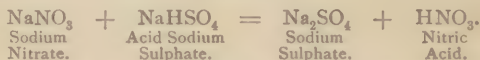
Preparation.—By acting on Chili Saltpetre (sodium nitrate) with H_2SO_4 . If two molecules of NaNO_3 and one of H_2SO_4 be taken, the reaction will be as follows:—

Decomposition of 1st molecule NaNO_3 .



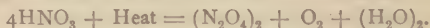
Then by raising the heat, the NaHSO_4 acts upon the second molecule of NaNO_3 .

Decomposition of 2d molecule NaNO_3 .



There are several varieties of nitric acid in commerce. The official acid of 1.42 sp. gr. is termed 43° acid. The ordinary weaker commercial acid of 1.355 sp. gr. is called 38° acid. The reddish acid, known as *nitrous acid*, is nitric acid containing more or less nitrogen tetroxide (N_2O_4). The same acid may be made by impregnating nitric acid with nitrogen dioxide (N_2O_2).

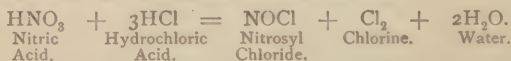
The effect of red heat on nitric acid. It evolves O, as follows:—



The Great Characteristic Property of Nitric Acid.—It oxidizes sulphur and phosphorus, giving rise to sulphuric and phosphoric acids, and it oxidizes all the metals with but few exceptions. It is the great oxidizing agent.

ACIDUM NITRICUM DILUTUM, U. S.—Dilute Nitric Acid.—A colorless liquid, containing 10 per cent. absolute HNO_3 (14.3 per cent. official nitric acid). Specific gravity 1.059, prepared by diluting 1 p. Nitric Acid with 6 p. Distilled Water.

ACIDUM NITROHYDROCHLORICUM, U. S.—Nitrohydrochloric Acid. *Nitromuriatic Acid. Aqua Regia*.—A golden-yellow, fuming, and very corrosive liquid, having a strong odor of Cl, and a strong acid reaction, and containing nitrosyl chloride and free chlorine. It is made by mixing together 4 p. nitric acid, 15 p. hydrochloric acid in a capacious open glass vessel, and, after effervescence ceases, preserving in a cool, dark place, in glass-stoppered bottles, half full.



Nitrohydrochloric acid should be kept in a cool, dark place, because it loses Cl by heat, and its Cl is converted into HCl by the action of light and the decomposition of its water.

It is called *Aqua Regia*, because of its power of dissolving gold, the king of metals.

It is indispensable, in keeping and dispensing it, that care should be taken not to confine it until all effervescence ceases, or explosion is likely to occur. And the same care should be exercised in dispensing it in mixtures.

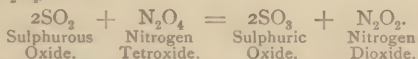
ACIDUM NITROHYDROCHLORICUM DILUTUM, U. S.—Diluted Nitrohydrochloric Acid.—A colorless, or faintly yellow liquid, odorless, or with faint odor of Cl, with a very acid taste and reaction, made by mixing 4 p. nitric acid with 15 p. hydrochloric acid, and after effervescence has entirely ceased, diluting with 76 p. distilled water.

These directions should be literally obeyed, because, unless the acids are mixed while concentrated, NOCl and Cl are not produced.

ACIDUM SULPHURICUM, U. S.—Sulphuric Acid. H_2SO_4 . *Oil of Vitriol*.—A colorless liquid, of an oily appearance, composed of not less than 96 per cent. absolute H_2SO_4 and not more than 4 per cent. water, and with specific gravity not below 1.840; inodorous; strongly caustic and corrosive; strongly acid reaction.

Sulphuric Acid is prepared by burning S or FeS_2 (iron pyrites) in the air, by which SO_2 is formed. These fumes are conducted into leaden chambers and allowed to mix with steam and nitrous fumes obtained from the decomposition of sodium nitrate. The SO_2 is oxidized into SO_3 by the nitrous fumes containing nitrogen tetroxide (N_2O_4), which gives up part of its O for that purpose. SO_3 then unites with the H_2O (steam) present to form H_2SO_4 . The H_2SO_4 condenses on the floor of the leaden chambers and is afterward drawn off and concentrated.

The reactions are as follows: First two molecules of SO_2 react with one molecule of N_2O_4 , thus:—



In this reaction, N_2O_4 gives up two atoms of its O to 2SO_2 , which becomes 2SO_3 in consequence, and N_2O_4 is reduced to N_2O_2 . Then N_2O_2 goes back to the air for more O, and becomes N_2O_4 again ($\text{N}_2\text{O}_2 + \text{O}_2 = \text{N}_2\text{O}_4$). The N_2O_4 thus formed gives up its O_2 to fresh portions of 2SO_2 , converting it into 2SO_3 , as before, and this operation is repeated again and again, until all the 2SO_2 is oxidized into 2SO_3 . During this time the 2SO_3 that is formed unites with the vapors of H_2O present, and forms H_2SO_4 ($\text{SO}_3 + \text{H}_2\text{O} = \text{H}_2\text{SO}_4$). The nitrous fumes thus act as an oxygen carrier between sulphurous oxide and the air, and raise the former to sulphuric oxide.

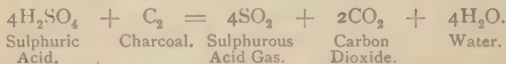
ACIDUM SULPHURICUM AROMATICUM, U. S.—Elixir of Vitriol.—An aromatic elixir of sulphuric acid, prepared by mixing together Sulphuric Acid 200 p.; Tr. Ging. 45 p.; Ol. Cinnam. 1 p.; Alcohol to 1000 p.

ACIDUM SULPHURICUM DILUTUM, U. S.—Diluted Sulphuric Acid.—A colorless liquid, containing 19 per cent. official sulphuric acid, with specific gravity 1.067, and prepared by diluting 1 p. Sulphuric Acid with 9 p. Distilled Water.

ACIDUM SULPHUROSUM, U. S.—Sulphurous Acid. H_2SO_3 .—A colorless liquid, of a characteristic sulphurous odor and taste, with specific gravity 1.022–23, composed of about 3.5 per cent. of sulphurous acid gas and about 96.5 per cent. of water. It has a characteristic odor of burning sulphur; very acid, sulphurous taste; strongly acid reaction.

Preparation.—By pouring 14 p. H_2SO_4 on 2 p. coarsely powdered charcoal, in a flask connected with a wash-bottle, and a bottle partially filled with 100 p. distilled water. Gentle heat is applied, and the gas distilled over. A bottle containing a solution of Na_2CO_3 is provided to absorb the excess of gas that bubbles up through the distilled water, and the latter is kept cool by placing ice around the bottle, as cold water will absorb more gas than warm water.

Equation for the reaction that occurs:—



ACIDUM PHOSPHORICUM, U. S.—Phosphoric Acid. Syrupy Phosphoric Acid. Orthophosphoric Acid. H_3PO_4 .—A colorless, syrupy liquid, of specific gravity 1.347, composed of 50 per cent. Orthophosphoric Acid and 50 per cent. of water. Odorless; strongly acid taste; acid reaction.

Preparation.—By distilling phosphorus with nitric acid and distilled water. The phosphorus is oxidized, and, uniting with the water, forms H_3PO_4 .

Equation expressing the reaction:—



Special directions for preparing this acid are given in the U. S. P. The official process was devised to rid the finished product of the impurities, nitric, phosphorus, and arsenic acids. Small portions are tested for these impurities (see U. S. P.), which are then disposed of as follows: *Nitric Acid*—evaporate until no reaction for nitric acid can be obtained. *Phosphorous Acid*—add nitric acid and distilled water, and again evaporate until no reaction for phosphorous or nitric acid can be obtained. *Arsenic Acid*—dilute and pass through H_2S , first while hot, then when cold.

The most dangerous impurity, arsenic, is due to the sulphuric acid, made from iron pyrites, which is used in making the phosphorus.

ACIDUM PHOSPHORICUM DILUTUM, U. S.—Diluted Phosphoric Acid.—A colorless liquid of specific gravity 1.057, containing 10 per cent. orthophosphoric acid, and prepared by diluting 20 p. of phosphoric acid with 80 p. distilled water.

A precipitate sometimes occurs on mixing this acid with tincture of chloride of iron, generally due to the presence of pyrophosphoric acid. Pyrophosphate of iron is formed as an insoluble gelatinous precipitate.

CHLORINE, BROMINE, AND IODINE.

(THE HALOGENS.)

Cl; 35.4. Br; 79.8. I; 126.6.

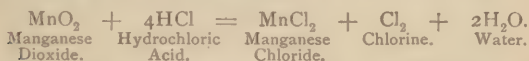
The four Halogens (salt producers) are *Chlorine*, *Bromine*, *Iodine*, *Fluorine*. The latter is not used in Pharmacy.

CHLORINE—CHLORINE. Cl; 35.4.

A greenish-yellow, gaseous body, having a very suffocating odor, and specific gravity 2.45.

AQUA CHLORI, U. S.—Chlorine Water.—A greenish-yellow, clear liquid, having the suffocating odor and disagreeable taste of chlorine, made by passing Cl gas, generated by heating HCl with manganese dioxide, into distilled water until a saturated solution is produced.

Equation for the reaction that occurs :—



Chlorine Water should be secluded from the light, because it is partially converted into HCl by the light, owing to the decomposition of the water, the Cl uniting with the H of the water to form HCl.

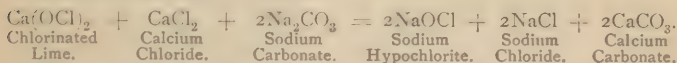
Chlorine Water may be made extemporaneously by placing HCl f 3 iij in a pint bottle, adding Potass. Chlor., 40 gr. When the bottle is full of Cl vapor, add 1 fluidounce Distilled Water. Not recommended.

CALX CHLORATA, U. S.—Chlorinated Lime.—A white, or grayish-white, dry, or but slightly damp powder, or friable lumps containing 25 per cent. available chlorine, and prepared by subjecting calcium hydrate, placed on trays in a suitable chamber, to the action of chlorine.

Its chemical formula is probably CaOCl_2 , yielding, by decomposition with water, calcium hypochlorite and calcium chloride. It is used as a disinfectant and for bleaching purposes, and its usefulness depends on its chlorine, which, being loosely combined, is, therefore, available.

LIQUOR SODÆ CHLORATÆ, U. S.—Solution of Chlorinated Soda. *Labarraque's Solution*.—A clear, pale, greenish liquid, of a faint odor of chlorine, a disagreeable and alkaline taste, and an alkaline reaction, made by decomposing solution of chlorinated lime with sodium carbonate, and containing sodium hypochlorite and sodium chloride, calcium carbonate separating out as a precipitate.

Equation expressing the reaction :—

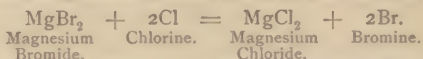


Eau de Javelle (*Javelle Water*) is a French preparation made with K_2CO_3 instead of Na_2CO_3 .

BROMUM, U. S.—BROMINE. Br; 79.8.

A dark, brownish-red, mobile liquid, evolving, even at the ordinary temperature, a yellowish-red vapor highly irritating to the eyes and lungs;

peculiarly suffocating odor, resembling that of chlorine; prepared by decomposing crude magnesium bromide (bittern) with chlorine gas.

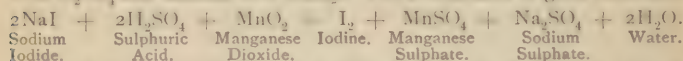


Bibron's Antidote to Rattlesnake Poison.—Bromine, 300 gr.; Dil. Alcohol, f ʒ viij. Mix. KI, 4 gr.; Corros. Sub., 2 gr. Place in a mortar and add q. s. of the solution to dissolve them.

IODUM, U. S.—IODINE. I; 126.6.

Heavy, bluish-black, dry and friable, rhombic plates, of a metallic lustre, distinctive odor, sharp and acrid taste, neutral reaction, formerly obtained exclusively from the ashes of seaweed (kelp), but now made from the mother liquor obtained from the crystallization of sodium nitrate in South America, in which it occurs in the forms of sodium iodide and iodate.

Preparation.—The iodides are decomposed by Cl, iodine being set free, whilst the iodine from the iodates is precipitated by acid sodium sulphite. *Kap* contains iodine in the form of NaI. The solution from it is treated with H₂SO₄ and distilled with MnO₂. The I condenses in glass receivers.

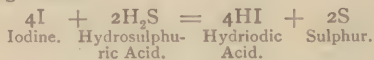


The U. S. P. preparations of Iodine: *Iodum*, *Tinctura Iodi*, *Liquor Iodi Compositus*, *Unguentum Iodi*, *Amylum Iodatum*, *Syrupus Acidi Hydriodici*.

AMYLUM IODATUM, U. S.—Iodized Starch.—Take of Starch 95 p.; Iodine 5 p.; Distilled Water, to make 100 p. Triturate the Iodine with a little Distilled Water, add the Starch gradually, and continue the triturating until the compound assumes a uniform blue color, approaching black. Dry it at a temperature not exceeding 40° C. (104° F.), and rub it to a fine powder.

SYRUPUS ACIDI HYDRIODICI, U. S.—Syrup of Hydriodic Acid.—A syrupy liquid, containing 1 per cent. of absolute Hydriodic Acid, having the specific gravity 1.300, and is made by adding an alcoholic solution of Iodine to Syrup, and passing through the mixture Hydrosulphuric Acid gas until the color of Iodine is discharged. The H₂S is disposed of by evaporation. When cold, it is flavored with spirit of orange, and more sugar added.

Equation showing the reaction that occurs when H₂S is passed into a solution containing Iodine:—



SULPHUR AND PHOSPHORUS.

S; 32. P; 31.

SULPHUR. S; 32.

Sulphur occurs uncombined in Sicily and in other parts of the world, and is widely diffused in the form of sulphates and sulphides.

Rol' sulphur is prepared by fusing sulphur, permitting it to stand, to separate impurities, and then pouring into cylindrical moulds.

Three forms of sulphur are officinal: *sublimed*, *washed*, and *precipitated* sulphur.

HYDROSULPHURIC ACID.—**Sulphuretted Hydrogen.**—An offensive gas formed by the combination of two parts hydrogen with one part sulphur, H_2S , also known as *hydrogen sulphide*. It is made by acting on ferrous sulphide with dilute sulphuric acid, and is used for testing the presence of metals, with which it forms characteristic precipitates.

SULPHUR SUBLIMATUM, U. S.—**Flowers of Sulphur.**—A fine, citron yellow powder, of a slight characteristic odor, and generally of a faintly acid taste, made by conducting the vapor of sulphur into a cool chamber, where it condenses in the form of crystalline powder.

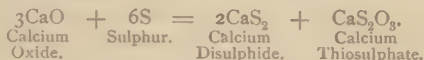
SULPHUR LOTUM, U. S.—**Washed Sulphur.**—A fine, citron-yellow powder, odorless and almost tasteless, made by washing sublimed sulphur with water containing ammonia, to rid it of sulphuric acid and other impurities.

SULPHUR PRÆCIPITATUM, U. S.—**Precipitated Sulphur.**—A very fine, yeilowish-white, amorphous powder, odorless and almost tasteless, made by precipitating a solution of calcium disulphide with hydrochloric acid.

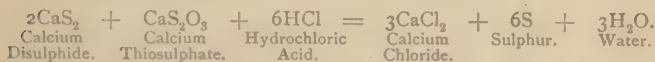
Calcium disulphide is prepared by boiling unslaked lime with sublimed sulphur, cooling, and filtering off the clear solution of calcium disulphide, which is then precipitated with HCl .

Equations describing the reactions that occur:—

1st. The lime and sulphur react to form calcium disulphide and calcium thiosulphate (hyposulphite).



2d. HCl is added, which precipitates the sulphur.



Lac Sulphuris, or Milk of Sulphur.—In some processes, H_2SO_4 is used instead of HCl . This precipitates calcium sulphate with the sulphur, giving it a milky color. It is an inferior product.

SULPHURIS IODIDUM, U. S.—**Sulphur Iodide.**—A grayish-black solid, generally in pieces, having a radiated, crystalline appearance, with a characteristic odor of iodine; somewhat acrid taste; faintly acid reaction; made by heating 1 p. sulphur with 4 p. iodine. It is also known as *subiodide of sulphur*, or *iodine disulphide* (?), S_2I_2 .

CARBONEI BISULPHIDUM, U. S.—**Disulphide of Carbon.**—A clear, colorless, very diffusive, highly refractive liquid, with strong characteristic odor, and sharp, aromatic taste; neutral. Specific gravity 1.272. Made by the direct combination of carbon and sulphur, at a moderate red heat.

Preparation.—Charcoal is heated to redness, in a vertical cylinder provided with a lateral tubulure near the bottom, through which sulphur is admitted. The sulphur melts, volatilizes, and unites with the carbon, forming carbon bisulphide. This distills over and condenses in tubes, which collect it while allowing the H_2S formed at the same time to escape. It is then purified by agitation with mercury, and distillation in contact with white wax. By repeated rectification it can be made odorless. Used principally as a solvent. Best solvent for rubber, etc.

The officinal preparations of sulphur are: *Unguentum Sulphuris*—made by mixing 30 p. Sub. Sulph. with 70 p. Benz. Lard. *Unguentum Sulphuris Alkalinum*—20 p. Washed S.; 10 p. K_2CO_3 ; 5 p. Water; 50 p. Benz. Lard.

PHOSPHORUS. P; 31.

A translucent, nearly colorless solid, of a waxy lustre, having, at the ordinary temperature, about the consistence of beeswax, and with a distinctive, disagreeable odor and taste. It is prepared by deoxidizing phosphoric acid with carbon. This is accomplished by heating acid calcium phosphate, obtained by treating calcium phosphate with sulphuric acid, with charcoal.



The process is conducted in a retort. Carbon, at a high temperature, takes oxygen from the phosphoric acid, and becomes carbonic acid. Phosphorus and carbonic oxide distill over, and the former is condensed in water, while the latter escapes.

Red Phosphorus.—A non luminous, non-poisonous, red amorphous powder, consisting of phosphorus in one of its allotropic forms, prepared by allowing phosphorus to remain in an atmosphere of carbon dioxide for several days, at a temperature ranging from 215° to 250° C. (419° – 482° F.). By heating it to 280° C. (536° F.) it is converted into ordinary phosphorus.

The three oxides formed by phosphorus are: Phosphoric Oxide, $\text{P}_2\text{O}_5^{\text{V}}$; Phosphorous Oxide, $\text{P}_2\text{O}_3^{\text{III}}$; and Hypophosphorous Oxide (?), $\text{P}_2\text{O}^{\text{I}}$.

The three corresponding acids are: Orthophosphoric Acid (tribasic acid), H_3PO_4 ; Pyrophosphoric Acid, $\text{H}_4\text{P}_2\text{O}_7$; and Metaphosphoric Acid, HPO_3 .

These acids are prepared as follows: Orthophosphoric Acid—by dissolving P_2O_5 in boiling water ($\text{P}_2\text{O}_5 + 3\text{H}_2\text{O} = 2\text{H}_3\text{PO}_4$). Pyrophosphoric Acid—by heating orthophosphoric acid to 213° C. (415° F.). Metaphosphoric Acid—by igniting orthophosphoric acid.

Orthophosphoric acid may also be made by acting on P with HNO_3 . Metaphosphoric acid may also be prepared by dissolving P_2O_5 in cold water.

The officinal Acidum Phosphoricum is the orthophosphoric acid.

There are two other phosphoric acids: Phosphorous Acid H_3PO_3 (dibasic, containing one H atom not replaceable by a metal); and Hypophosphorous Acid, H_3PO_2 (monobasic, containing two H atoms not replaceable by a metal). These acids cannot be produced directly from their cor-

responding oxides, Phosphorous Oxide (P_2O_3), and Hypophosphorous Oxide, P_2O .

Preparations of phosphorus, officinal: Phosphorus itself, Oleum Phosphoratum (I p. P. in Ol. Amygd. Dulc.) and Pilule Phosphori. (See Part II.)

CARBON, BORON, AND SILICON.

C; 12. B; 11. Si; 28.

CARBON. C; 12.

Carbon is a constituent of all organic substances, and found in nature in the forms of coal, plumbago, diamond, etc.

The two oxides of carbon and their corresponding acids are, carbon dioxide, CO_2 , and carbonic acid, H_2CO_3 ($CO_2 + H_2O = H_2CO_3$), carbon monoxide, CO, which is of little interest in pharmacy.

Carbon Dioxide.—A colorless, odorless gas, with slightly acid taste, heavier than the air, incombustible and a non-supporter of combustion. Water absorbs its own volume of it at ordinary temperature and pressure, and many times its volume under cold and pressure.

Aqua Acidi Carbonici or "Soda Water." A solution of Carbon dioxide in water made under pressure, and dispensed under the well-known name, "Soda Water." It was formerly officinal.

CARBO ANIMALIS, U. S.—Animal Charcoal. *Bone Black, or Ivory Black*.—Dull-black, granular fragments, or a dull-black powder, odorless and nearly tasteless, prepared by subjecting bones to a red heat in close vessels.

Preparation.—Bones consist of calcium phosphate and carbonate with animal matter. In the destructive distillation, which is conducted in iron cylinders without access of air, the N and H of the animal matter unite to form NH_3 , which distills over, leaving most of the C behind with the calcium salts.

Bone Spirit and Bone Oil.—The ammoniacal liquor and dark tarry liquid that distill over are known as bone spirit and bone oil, respectively.

CARBO ANIMALIS PURIFICATUS, U. S.—Purified Animal Charcoal.—Animal charcoal purified from calcium salts by HCl .

CARBO LIGNI, U. S.—Charcoal.—Prepared by burning wood out of contact with the air, whereby its volatile portions, hydrogen, oxygen, water, etc., are dissipated, carbon, mixed with mineral salts, being left.

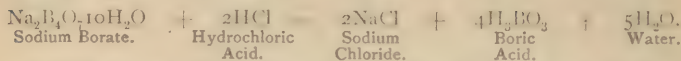
BORON. B; 11.

Boron exists in three allotropic forms, amorphous, crystalline, and graphitoidal (same as carbon).

The result of its combination with O and H is Boric (Boracic) Acid, H_3BO_3 .

ACIDUM BORICUM, U. S.—Boric Acid. *Boracic Acid*. H_3BO_3 .—Is obtained in the lagoons in Tuscany; in California lakes, etc., in the

forms of boric acid and borate of sodium (borax). Boric acid is made by decomposing borax with HCl:—



Acidum Boricum occurs in the form of transparent, colorless, six-sided plates, slightly unctuous to the touch, permanent in the air. Odorless; cooling, bitterish taste, feebly acid in solution.

SILICON. Si; 28.

Silicon exists in three allotropic forms, amorphous, crystalline, and graphitoidal.

It is found in combination with Al, Mg, and Ca, in pumice, meerschaum, asbestos, etc., and as an anhydride (silica) in sand, flint, quartz, etc.

SILICA. SiO_2 .—**Silicon Anhydride.**—Is obtained in a pure condition by treating the officinal solution of silicate of sodium with HCl:—



LIQUOR SODII SILICATIS, U. S.—(Na_2SiO_3). Soluble Glass. —A semi-transparent, almost colorless, or yellowish, or pale greenish yellow, viscid liquid, specific gravity 1.3 or 1.4. Odorless; sharp, saline, and alkaline taste; alkaline reaction. Made by fusing 1 p. fine sand (silica) with 2 p. dried sodium carbonate, and dissolving the product.

Used in surgery to prepare mechanical dressings.

POTASSIUM, SODIUM, LITHIUM, AND AMMONIUM.

K; 39. Na; 23. Li; 7. NH_4 ; 18.

Alkali Metals and their Characteristics—The alkaline metals are Potassium, Sodium, and Lithium. They are characterized, 1, by their silvery-white appearance; 2, softness; 3, powerful affinity for oxygen; 4, lightness, being lighter than water, on which they float and take fire spontaneously, owing to their power of decomposing that fluid. They are all univalent.

The metals may be obtained by exposing their carbonates, mixed with charcoal, to an intense heat, carbon monoxide being liberated, and the vaporized metals condensed in appropriate receivers.

Ammonium is a compound radicle, consisting of NH_4 , but, owing to its many analogies with the alkali metals, classed with them.

Characteristics of Alkalies.—1. They combine with acids to form salts. 2. They restore the color of reddened litmus, turn vegetable blues to green, and yellow to brown. 3. Their taste is characteristic and, if concentrated, caustic.

POTASSIUM.

Sources of the Potassium Salts.—Formerly, wood ashes; now, the principal source is an impure chloride from the Stassfurt mines, in Germany.

Lye, Potash, and Pearlash.—When wood is burned to ashes, the salts of potassium contained therein are converted into *carbonates*. Wood ashes are placed in a conical wooden vessel, termed a *leach*, and water allowed to percolate through, which becomes impregnated with the potassium carbonate contained in the ashes, and the solution is called *lye*. By evaporating lye to dryness in an iron pot, a solid remains, consisting principally of impure carbonate, which is called *potash*. Potash, calcined on the hearth of a reverberating furnace, loses its water and becomes white. It is then known as *pearlash*, and is an impure carbonate of potassium.

POTASSA, U. S.—Caustic Potash. [Potassium Hydrate, Potassium Hydroxide, Caustic Potash]. KHO ; 56.—A white, hard, and dry solid, generally in form of pencils; very deliquescent; odorless or having a faint odor of lye; very acrid and caustic taste; strongly alkaline reaction. Prepared from wood ashes by lixiviating, evaporating, purifying, redissolving, treating with lime, evaporating, fusing, and casting into moulds.

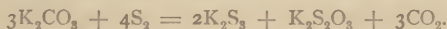


POTASSA CUM CALCE, U. S.—Potassa with Lime.—A grayish-white powder, deliquescent, strongly alkaline, made by mixing together equal parts well-dried potassa and lime.

LIQUOR POTASSÆ, U. S.—Solution of Potassa.—An aqueous solution of hydrate of potassium, containing about 5 per cent. of the hydrate; clear and colorless; odorless; with very acrid and caustic taste; strongly alkaline reaction. Made by decomposing potassium bicarbonate through the action of calcium hydrate and heat, or by dissolving the hydrate in water.

POTASSA SULPHURATA, U. S.—Sulphurated Potassa.

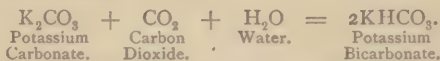
Liver of Sulphur.—An indefinite chemical compound, occurring in irregular pieces, of a liver-brown color when freshly prepared, turning gradually to greenish yellow or brownish-yellow, with a faint, disagreeable odor, and bitter, alkaline, repulsive taste; alkaline reaction. Made by melting potassa and sulphur together in a crucible, pouring the liquid on a slab, and cooling.



POTASSII ACETAS, U. S.—Potassium Acetate. $\text{KC}_2\text{H}_3\text{O}_2$; 98.—White, foliaceous, satiny, crystalline masses, or a white, granular powder; very deliquescent; odorless; warming, mildly pungent, and saline taste; neutral or faintly alkaline reaction. Made by decomposing potassium bicarbonate with acetic acid, filtering and evaporating, carefully avoiding contact with iron.

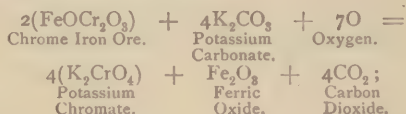


POTASSII BICARBONAS, U. S.—Potassium Bicarbonate. KHCO_3 ; 100.—Colorless, transparent, monoclinic prisms, permanent in dry air; odorless; saline and slightly alkaline taste; feebly alkaline reaction. Made by passing carbon dioxide into a solution of carbonate, evaporating, and crystallizing.



POTASSII BICHROMAS, U. S.—Potassium Bichromate. $\text{K}_2\text{Cr}_2\text{O}_7$; 294.8.—Large, orange-red, transparent, four-sided tabular prisms; permanent in the air; odorless; bitter, disagreeable, metallic taste; acid reaction; made by treating potassium chromate, prepared from *chrome iron ore*, with sulphuric acid, evaporating, and crystallizing.

The ore is heated with potassium carbonate and chalk in contact with air, and the following reaction takes place:—



Then—



POTASSII BITARTRAS, U. S.—Potassium Bitartrate. $\text{KHC}_4\text{H}_4\text{O}_6$; 188. (*Cream of Tartar*).—Colorless, or slightly opaque, rhombic crystals, or a white, somewhat gritty powder; permanent in the air; odorless; pleasant, acidulous taste; acid reaction. Made by purifying *argols*, the sediment deposited in wine casks during fermentation.

POTASSII BROMIDUM, U. S.—Potassium Bromide. KBr ; 118.8.—Colorless, translucent, cubical crystals; permanent in dry air; generally appearing in commerce in white, opaque, or semi-transparent crystals, having a faint alkaline reaction; odorless, pungent, saline taste; neutral reaction. Made by treating solution of potassa with bromine and charcoal.

The rationale of the process is as follows: Bromine added to solution potassa forms *bromide* and *bromate*. The solution is evaporated to dryness, and heated with charcoal, which deoxidizes the bromate, CO escaping.

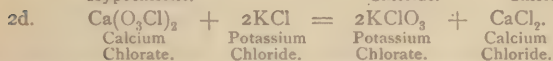
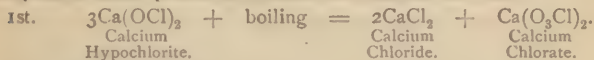


POTASSII CARBONAS, U. S.—Potassium Carbonate. $(\text{K}_2\text{CO}_3)_2 \cdot 3\text{H}_2\text{O}$; 330. (*Sal Tartar*).—A white, crystalline or granular powder, very deliquescent at 13°C . (59°F .); odorless; strongly alkaline taste; alkaline reaction. Made by purifying pearlash, by dissolving it in *cold water*, filtering, evaporating, and granulating.

POTASSII CHLORAS, U. S.—Potassium Chlorate. KClO_3 ; 122.4.—Colorless, monoclinic prisms or plates, of a pearly lustre, perma-

nent in the air; odorless; cooling, saline taste; neutral reaction. Made by reacting on potassium chloride with calcium hypochlorite.

The rationale of the process is as follows: When solution of calcium hypochlorite is boiled, it is decomposed into calcium chlorate and chloride; and when calcium chlorate is heated with potassium chloride, double decomposition forms potassium chlorate and calcium chloride.

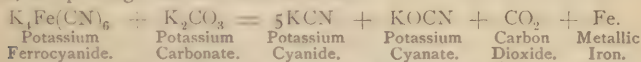


POTASSII CITRAS, U. S.—Potassium Citrate. $\text{K}_3\text{C}_6\text{H}_5\text{O}_7 \cdot \text{H}_2\text{O}$; 324.—A white, granular powder, deliquescent on exposure to air; odorless; slightly cooling, faintly alkaline taste; neutral or faintly alkaline reaction. Made by decomposing potassium bicarbonate with citric acid, filtering, evaporating, and granulating.

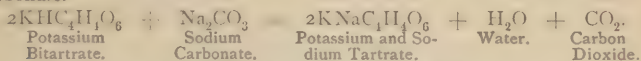


POTASSII CITRAS EFFERVESCENS, U. S.—Effervescent Potassium Citrate. Citric Acid 63 gm.; Potassium Bicarb. 90 gm.; Sugar 47 gm.; Powder ingredients separately and mix in warm water; Dry resulting paste at temperature not exceeding 120°C . (248°F .); reduce to powder.

POTASSII CYANIDUM, U. S.—Potassium Cyanide. KCN; 65.—White, opaque, amorphous pieces, or a white, granular powder, deliquescent in damp air; colorless when perfectly dry, but generally of a peculiar, characteristic odor; sharp, somewhat alkaline and bitter-almond taste; strongly alkaline reaction. Made by fusing potassium ferrocyanide with potassium carbonate, separating the insoluble precipitate of metallic iron, and pouring the fused mass on a slab.

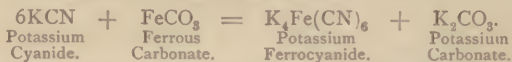


POTASSII ET SODII TARTRAS, U. S.—Potassium and Sodium Tartrate. *Rochelle Salt*. $\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$; 282.—Colorless, transparent, rhombic crystals, slightly efflorescent in dry air, or a white powder; odorless; cooling, mildly saline, and slightly bitter taste; neutral reaction. Made by treating solution of potassium bitartrate with sodium carbonate.

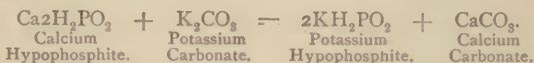


POTASSII FERROCYANIDUM, U. S.—Potassium Ferrocyanide. $\text{K}_4\text{Fe(CN)}_6 \cdot 3\text{H}_2\text{O}$; 421.9.—Large, coherent, lemon-yellow, translucent, and rather soft, four-sided prisms or tablets, slightly efflorescent in dry air; odorless, sweetish and saline taste; neutral reaction. Made by treating nitrogenized substances (refuse animal matter) with crude

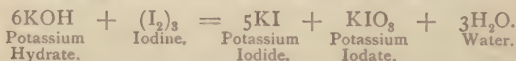
pearlash, by which impure potassium cyanide is formed, lixiviating, and treating with freshly-precipitated ferrous carbonate, which produces ferro-cyanide of potassium, by the following reaction:—



POTASSII HYPOPHOSPHIS, U. S.—Potassium Hypophosphite. KH_2PO_2 ; 104.—White, opaque, confused, crystalline masses, or a white, granular powder, very deliquescent; odorless; sharp, saline, slightly bitter taste; neutral reaction. Made by precipitating calcium hypophosphite with potassium carbonate, filtering, evaporating, and granulating, keeping it below 100°C . (212°F .) during the operation, for fear of explosion.



POTASSII IODIDUM, U. S.—Potassium Iodide. KI ; 165.6.—Colorless, translucent, cubical crystals, slightly deliquescent. The commercial salt generally appears in white, opaque crystals, having a faintly alkaline reaction; but single crystals laid upon moistened red litmus paper should not at once produce a violet blue stain (absence of more than one-tenth per cent. of alkali). At a dull red heat the salt melts without losing weight. Of a peculiar faint odor, pungent, saline, afterward somewhat bitter taste; neutral reaction. Made by treating solution of potassa with iodine, evaporating to dryness and heating with charcoal. The result is, the formation of two salts, Iodide and Iodate of Potassium:—



By evaporating to dryness, the mixed salts are obtained, and by exposing to heat with charcoal, the iodate is deoxidized to iodide.

POTASSII NITRAS, U. S.—Potassium Nitrate. KNO_3 ; 101.—Colorless, transparent, six-sided rhombic prisms, or a crystalline powder, permanent in the air. Odorless, cooling, saline, and pungent taste. Neutral reaction. Usually a natural product; produced artificially, however, in what are known as *nitre beds*, consisting of earth, wood-ashes, animal and vegetable refuse. Ammonia is produced by decomposition, is oxidized and nitric acid formed, which unites with the potassa in the ashes, and potassium nitrate results. This is separated by lixiviation, filtration, evaporation, and crystallization. It is commonly called Nitre or Saltpetre.

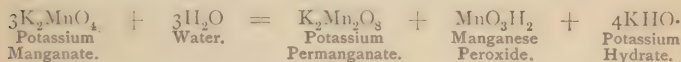
POTASSII PERMANGANAS, U. S.—Potassium Permanganate. $\text{K}_2\text{Mn}_2\text{O}_8$; 314.—Deep, purple-violet or nearly black, needle-shaped, rhombic prisms, of a metallic lustre, permanent in the air. Odorless, sweet, afterward disagreeable, astringent taste; neutral reaction. Made by heating together manganese dioxide, potassium chlorate, and potassa.

The rationale of the reaction is as follows: The salts are mixed together and heated in a crucible, which results in a semi-fused mass; this is boiled

with water and neutralized with dilute sulphuric acid, evaporated and crystallized. By this process, potassium chlorate yields oxygen to manganese dioxide, converting it into manganic acid, which unites with the potassa to form the manganate, potassium chloride being formed at the same time.



The potassium manganate is converted to potassium permanganate when the solution is boiled with water, as follows :—



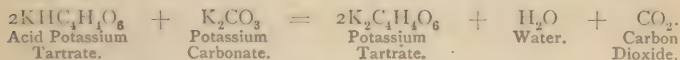
The acid is used to neutralize the potassium hydrate liberated by the reaction, for in the presence of an excess of potassa, the permanganate otherwise remains in the condition of manganate.

POTASSII SULPHAS, U. S.—Potassium Sulphate. K_2SO_4 ; 174.—Colorless, hard, six-sided, rhombic prisms, permanent in the air; odorless; sharp, saline, slightly bitter taste; neutral reaction. Made by purifying the residue from nitric acid manufacture, also from other sources, as *Kainite*, the mineral found in the Stassfurt salt-beds, which is a double sulphate of potassium and magnesium.

It may be made directly, at any time, by decomposing potassium nitrate with sulphuric acid.



POTASSII TARTRAS, Potassium Tartrate. $(\text{K}_2\text{C}_4\text{H}_4\text{O}_6)_2 \cdot \text{H}_2\text{O}$; 470.—Small, transparent, or white, monoclinic crystals, or a white powder, somewhat deliquescent. Odorless, saline, slightly bitter taste; neutral reaction. Made by treating solution of potassium bitartrate with potassium carbonate.



The precipitate which is formed is calcium tartrate, always found in potassium bitartrate. It must be filtered out.

LIQUOR POTASSII CITRATIS, U. S.—Solution of Potassium Citrate.—Potass. Bicarb., 8 p.; Citric Acid, 6 p.; in 100 p. Water.

MISTURA POTASSII CITRATIS, U. S.—Mixture of Potassium Citrate. (*Neutral Mixture.*)—Potass. Bicarb., 10 p.; Lemon Juice, 100 p.

LIQUOR POTASSII ARSENITIS, U. S.—Solution of Potassium Arsenite. *Fowler's Solution.*—Made by boiling Potass. Bicarb. with Arsenious Acid and adding Tr. Lav. Comp.

TROCHISCI POTASSII CHLORAS, U. S.—Troches of Potassium Chlorate.—5 Gr. Troches.

SODIUM.

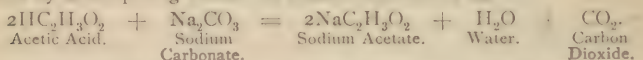
The Salts of Sodium are generally more frequently used than those of Potassium, because they are relatively cheaper and often more soluble.

SODA, U. S.—Soda. NaHO ; 40.—A white, hard, opaque solid, generally in the form of fibrous pieces, or of white, cylindrical pencils, deliquescent in moist air, but in dry air becoming dry and efflorescent; odorless; intensely acid and caustic taste; strongly alkaline reaction. Made by boiling solution of sodium carbonate with calcium hydrate and evaporating. Commercial name—Caustic Soda.

LIQUOR SODÆ, U. S.—Solution of Soda.—A clear, colorless liquid, consisting of hydrate of sodium (NaHO) about 5 per cent.; odorless; very acid and caustic taste; strongly alkaline reaction. Made by decomposing the carbonate by heating it in contact with an aqueous mixture of calcium hydrate, or by dissolving NaHO in water.

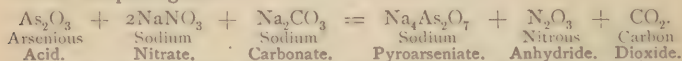
LIQUOR SODÆ CHLORATÆ, U. S.—Solution of Chlorinate Soda.—Made by double decomposition between Chlorinated Lime and Sodium Carbonate. (See Chlorine.)

SODII ACETAS, U. S.—Sodium Acetate. $\text{NaC}_2\text{H}_3\text{O}_2 \cdot 3\text{H}_2\text{O}$; 136.—Large, colorless, transparent, monoclinic prisms; efflorescent in dry air; odorless; saline, bitter taste; neutral or faintly alkaline reaction. Made by decomposing sodium carbonate with acetic acid.

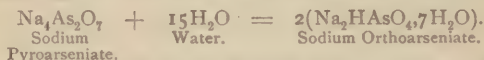


SODII ARSENAS, U. S.—Sodium Arsenate. $\text{Na}_2\text{HAsO}_4 \cdot 7\text{H}_2\text{O}$; 311.9.—Colorless, transparent, prismatic crystals; slightly efflorescent in dry air; odorless; mild, feebly alkaline taste; faintly alkaline reaction. Made by heating together arsenious acid, sodium nitrate, and sodium carbonate.

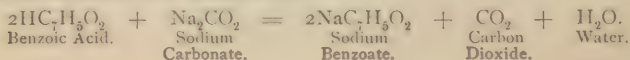
The rationale of this process is, that when these three salts are fused together, sodium pyroarsenate is formed, while nitrous anhydride and carbon dioxide escape as gases.



The sodium pyroarsenate is then converted into orthoarsenate by dissolving the former in water, filtering and crystallizing. The orthoarsenate is the official salt.



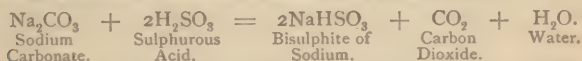
SODII BENZOAS, U. S.—Sodium Benzoate. $\text{NaC}_7\text{H}_5\text{O}_2 \cdot \text{H}_2\text{O}$; 162.—A white, semi-crystalline or amorphous powder; efflorescent on exposure to air; odorless, or having a faint odor of benzoin; sweetly-astringent taste, free from bitterness; neutral reaction. Made by decomposing sodium carbonate with benzoic acid.



SODII BICARBONAS, U. S.—Sodium Bicarbonate. NaHCO_3 ; 84.—A white, opaque powder, permanent in the air; odorless; cooling, mildly saline taste; slight alkaline reaction. Made by washing commercial sodium bicarbonate with water.

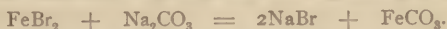
Sodium bicarbonate may also be prepared by Solvay's process. (See Sodium Carbonate.)

SODII BISULPHIS, U. S.—Sodium Bisulphite. NaHSO_3 ; 104.—Opaque, prismatic crystals, or a crystalline or granular powder; slowly oxidized and losing sulphurous acid on exposure to air; faint, sulphurous odor; disagreeable sulphurous taste; acid reaction. Made by saturating a solution of sodium carbonate with sulphurous acid.



SODII BORAS, U. S.—Sodium Borate. $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$; 382. (*Borax*.)—Colorless, transparent, shining, monoclinic prisms; slightly efflorescent in dry air; odorless; mild, cooling, sweetish, afterward somewhat alkaline, taste; alkaline reaction. Made by purifying the neutral salts found in immense quantities in California, as a crystalline deposit in the blue mud of an offset of Clear Lake. It is sometimes, also, called baborate of sodium, and is found native in Thibet, Persia, etc. Another name given it is *Tincal*. Tuscany is also a source of borax, where it occurs, principally, as crude boric acid.

SODII BROMIDUM, U. S.—Sodium Bromide. NaBr ; 102.8.—Small, colorless, or white, monoclinic crystals, or a crystalline powder, permanent in dry air; odorless; saline, slightly bitter, taste; neutral or faintly-alkaline reaction. Made by treating ferrous bromide with sodium carbonate. The ferrous bromide is made by acting on iron wire with bromine, in the presence of water, and, after filtering, adding Na_2CO_3 .



SODII CARBONAS, U. S.—Sodium Carbonate. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$; 286.—Large, colorless, monoclinic crystals; rapidly efflorescent in dry air, and falling into a white powder; odorless; sharp, alkaline taste; alkaline reaction.

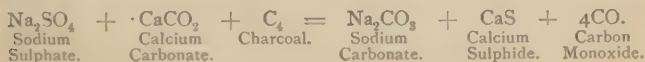
Sodium Carbonate is made by three processes, as follows:—

LEBLANC'S PROCESS.—Common salt is converted into sodium carbonate, in this process, by two steps.

First Step.—Salt is converted into sodium sulphate by sulphuric acid.



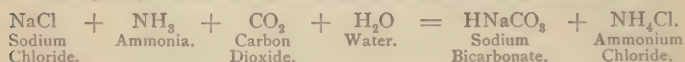
Second Step.—The sodium sulphate, or *salt cake*, is decomposed by calcium carbonate and charcoal, at a high temperature, so as to yield sodium carbonate.



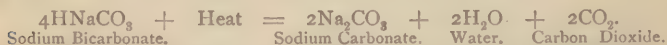
The sulphate, first dried, is mixed with its own weight of limestone and half its weight of coal, and fused into a black mass. Sodium sulphate is converted by the coal into sodium sulphide, which reacts with the limestone (calcium carbonate), so as to form calcium sulphide and sodium carbonate. The black mass is now digested in warm water, which takes up the alkali and leaves the insoluble impurities, called soda waste, which is afterward used in the manufacture of sodium hyposulphite. By evaporating to dryness, a mass is obtained, which is calcined with sawdust, which converts the alkali—owing to the carbonic acid resulting from its combustion—fully into carbonate. Redissolving in water, and evaporating to dryness, gives the commercial salt. *Soda-ash* contains about 50 per cent. of sodium carbonate.

SOLVAY'S PROCESS.—This process, also, has two steps, and is known as the **ammonia-soda process**.

First Step.—Carbon dioxide is passed into a solution of common salt in ammonia water, which results in a double decomposition. Sodium bicarbonate is precipitated and ammonium chloride remains in solution.

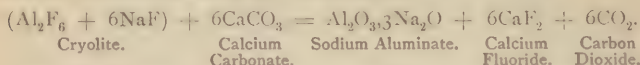


Second Step.—Sodium bicarbonate is decomposed into sodium carbonate by heat.

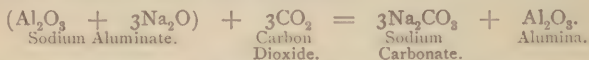


CRYOLITE PROCESS.—Largely used in the United States. This process has also two steps.

First Step.—Cryolite, which consists, mainly, of a double fluoride of aluminium and sodium ($\text{Al}_2\text{F}_6 + 6\text{NaF}$), is heated with chalk. Calcium fluoride is formed, while the sodium and aluminium combine to form sodium aluminate, which is dissolved out by lixiviation.



Second Step.—The soda is converted into carbonate by passing carbon dioxide, under pressure, through the solution. The alumina separates from the soda, becomes insoluble, and is deposited.

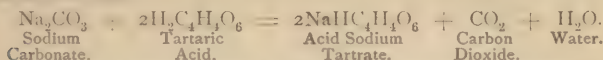


SODII CARBONAS EXSICCATUS, U. S.—Dried Sodium Carbonate.—A white, hygroscopic powder, made by heating the carbonate.

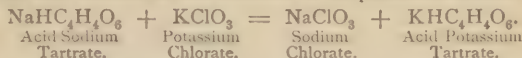
SODII CHLORAS, U. S.—Sodium Chlorate. NaClO_3 ; 100.4.—Colorless, transparent, tetrahedrons of the regular system, permanent in dry air; odorless; cooling, saline taste; neutral reaction. Made by double decomposition, between sodium bitartrate and potassium chlorate. (Wittstein's process.)

The details of the process are as follows:—

First, acid sodium tartrate is prepared by decomposing sodium carbonate with tartaric acid.



Then the acid sodium tartrate is added to the potassium chlorate:—



SODII CHLORIDUM, U. S.—Sodium Chloride. NaCl ; 58.4. (*Common Salt*.)—White, shining, hard, cubical crystals or a crystalline powder, permanent in the air; odorless; purely saline taste; neutral reaction. Obtained by evaporating sea water, and the salt from salt wells, springs, etc.

SODII HYPOPHOSPHIS, U. S.—Sodium Hypophosphite. $\text{NaH}_2\text{PO}_2 \cdot \text{H}_2\text{O}$; 106.—Small, colorless or white, rectangular plates, or a white, granular powder, deliquescent on exposure to the air; odorless; sweetish, saline taste; neutral reaction. Made by double decomposition between calcium hypophosphite and sodium carbonate.



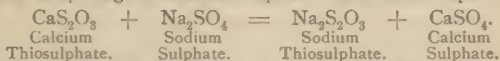
Sometimes this salt explodes with violence during evaporation; this is supposed to be due to the employment of too much heat. Evaporation should, therefore, be performed below 100°C . (212°F .).



Hydrogen and phosphoretted hydrogen are evolved, the latter being spontaneously inflammable.

Hypophosphorous acid is the acid present in this salt.

SODII HYPOSULPHIS, U. S.—Sodium Hyposulphite. $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$; 248. (*Sodium Thiosulphate*.)—Large, colorless, transparent, monoclinic prisms or plates, efflorescent in dry air; odorless; cooling, somewhat bitter and sulphurous taste; neutral or faintly alkaline reaction. Made by decomposing calcium thiosulphite with sodium sulphate.



SODII IODIDUM, U. S.—Sodium Iodide. NaI ; 149.6.—Minute, colorless or white, monoclinic crystals, or a crystalline powder, deliquescent on exposure to air; odorless; saline, and slightly bitter taste; neutral or faintly alkaline reaction. Made by treating ferrous iodide with sodium carbonate.



SODII NITRAS, U. S.—Sodium Nitrate. NaNO_3 ; 85. (*Cubic Nitre. Chili Saltpetre*.)—Found in Chili and Peru.

Colorless, transparent, rhombohedral crystals, slightly deliquescent in damp air; odorless; cooling, saline, and slightly bitter taste; neutral reaction. Made by purifying the native salt.

It is the cheapest source for obtaining nitrates.

SODII NITRIS, U. S.—Sodium Nitrite. NaNO_2 ; 68.93.—White, opaque, fused masses, usually in the form of pencils, or colorless, transparent, hexagonal crystals; odorless, and having a mild, saline taste.

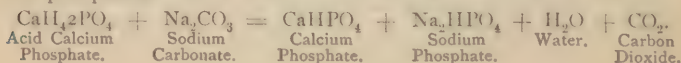
SODII PHOSPHAS, U. S.—Sodium Phosphate. $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$; 358.—Large, colorless, transparent, monoclinic prisms, speedily efflorescing and becoming opaque on exposure to air; odorless; cooling, saline and feebly alkaline taste; slightly alkaline reaction. Made by treating acid calcium phosphate with sodium carbonate. The details of the process are as follows:—

Acid calcium phosphate is made from bones, by treating them with sulphuric acid, after thorough calcination. To the concentrated liquid obtained by boiling this solution down, carbonate of sodium is added until the phosphoric acid is completely saturated. The liquid is then filtered and set aside to crystallize.

Details.—Bones consist of neutral calcium phosphate and animal matter. The latter is separated by burning them to whiteness, leaving a powder called bone phosphate or bone ash, associated with some calcium carbonate. When this is mixed with sulphuric acid, the calcium carbonate is decomposed, giving rise to effervescence. The calcium phosphate undergoes partial decomposition; the greater part of the lime being liberated, precipitates as calcium sulphate, while the phosphoric acid combines with the undecomposed portions of the phosphate, and remains in solution as an acid calcium phosphate, holding dissolved a small portion of calcium sulphate.



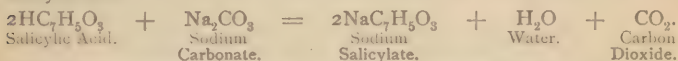
“In order to separate the acid phosphate from the precipitated mass of calcium sulphate, boiling water is added to the mixture. The whole is strained, and the sulphate washed as long as acid phosphate is removed, which is known by the water passing through in an acid state. The different liquids which have passed the strainer, consisting of the solution of acid calcium phosphate, are mixed and allowed to stand, and, by cooling, a portion of calcium sulphate is deposited, which is got rid of by decantation. The bulk of the liquid is now reduced by evaporation, and, in consequence of the diminution of water, a fresh portion of calcium sulphate is deposited, which is separated by subsidence and decantation, as before. The acid calcium phosphate solution being heated, is now saturated by means of a hot solution of sodium carbonate, the carbonic acid is liberated with effervescence, and the alkali, combining with the excess of acid of the acid phosphate, produces sodium phosphate, while the acid calcium phosphate, by the loss of its excess of acid, becomes the neutral phosphate, and precipitates.



"The calcium phosphate is separated by filtration, and the filtered liquor, which is a solution of sodium phosphate, is evaporated, so as to crystallize."—(Remington.)

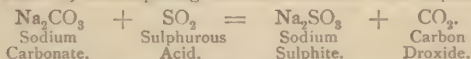
SODII PYROPHOSPHAS, U. S.—Sodium Pyrophosphate. $\text{Na}_4\text{P}_2\text{O}_7 \cdot 10\text{H}_2\text{O}$; 446.—Colorless, translucent, monoclinic prisms; permanent in the air. Odorless; cooling, saline and feebly alkaline to the taste; slightly alkaline reaction. Made by heating sodium phosphate to redness, dissolving and crystallizing.

SODII SALICYLAS, U. S.—Sodium Salicylate. $2\text{NaC}_7\text{H}_5\text{O}_3 \cdot \text{H}_2\text{O}$; 338.—Small, white, crystalline plates or a crystalline powder; permanent in the air. Odorless; sweetish, saline and mildly alkaline taste; feebly acid reaction. Made by decomposing sodium carbonate with salicylic acid.



SODII SULPHAS, U. S.—Sodium Sulphate. $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$; 322. (*Glauber's Salt*).—Large, colorless, transparent, monoclinic prisms, rapidly efflorescent on exposure to air, and ultimately falling into a white powder; insoluble in alcohol; odorless; cooling, saline and somewhat bitter taste; neutral reaction. Made by treating common salt with sulphuric acid.

SODII SULPHIS, U. S.—Sodium Sulphite. $\text{Na}_2\text{SO}_3 \cdot 7\text{H}_2\text{O}$; 252.—Colorless, transparent, monoclinic prisms; efflorescent in dry air; odorless; cooling, saline and sulphurous taste; neutral or feebly alkaline reaction. Made by decomposing sodium carbonate with sulphurous acid.



SODII SULPHOCARBOLAS, U. S.—Sodium Sulphocarbolate. $\text{NaC}_6\text{H}_5\text{SO}_4 \cdot 2\text{H}_2\text{O}$; 232.—Colorless, transparent, rhombic prisms; permanent in the air; odorless, or nearly so; cooling, saline, somewhat bitter taste; neutral reaction. Made by double decomposition between barium sulphocarbolate and sodium carbonate.

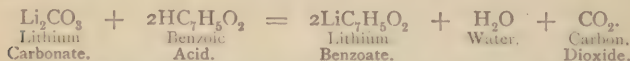
The details of the process are as follows: Carbolic acid and strong sulphuric acid are mixed together, which produces sulphocarbolic acid, $\text{C}_6\text{H}_5\text{HSO}_4$. After submitting the mixed liquids to a temperature of 55°C . (131°F .) for several days, the product is diluted in water. It is then mixed with barium carbonate gradually until effervescence ceases. Barium sulphate is precipitated also by any carbonate which may be present, and the liquor filtered. The solution of barium sulphocarbolate is now decomposed by a sodium carbonate. The liquor is filtered from barium carbonate and sodium sulphocarbolate obtained by evaporating and crystallizing.



TROCHISCI SODII BICARBONATIS, U. S.—Troches of Bicarbonate of Sodium.—Each three grains. (See Trochisci, Part II.)

LITHIUM. Li; 7.

LITHII BENZOAS, U. S.—Lithium Benzoate. $\text{LiC}_7\text{H}_5\text{O}_2$; 128.—A white powder, or small, shining scales; permanent in the air; odorless, or having a faintly benzoïn-like odor; cooling and sweetish taste; faintly acid reaction; made by treating lithium carbonate with benzoic acid.

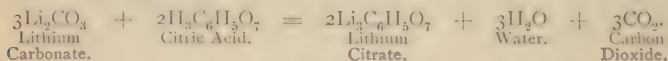


LITHII BROMIDUM, U. S.—Lithium Bromide. LiBr ; 86.8.—A white, granular salt, very deliquescent; odorless; very sharp, somewhat bitter taste; neutral reaction. Made by decomposing ferrous bromide with lithium carbonate.



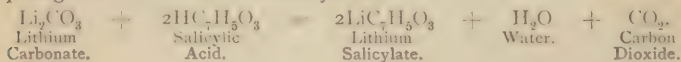
LITHII CARBONAS, U. S.—Lithium Carbonate. Li_2CO_3 ; 74.—A light, white powder; permanent in the air; odorless; alkaline taste; alkaline reaction. Made by precipitating lithium sulphate with ammonium carbonate.

LITHII CITRAS, U. S.—Lithium Citrate. $\text{Li}_3\text{C}_6\text{H}_5\text{O}_7$; 210.—A white powder; deliquescent on exposure to air; odorless; slightly cooling, faintly alkaline taste; neutral reaction. Made by decomposing the carbonate with citric acid.

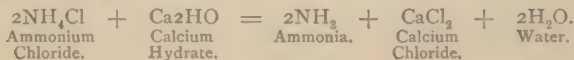


LITHII CITRAS EFFERVESCENS, U. S.—Effervescent Lithium Citrate.—Made by triturating 370 gm. citric acid, with about 200 gm. sugar, drying the mixture, and incorporating with it, by trituration, 70 gm. Lith. Carb., and 280 gm. Sodium Bicarb. with Sugar q. s. ft. 1000 gm.

LITHII SALICYLAS, U. S.—Lithium Salicylate. $2\text{LiC}_7\text{H}_5\text{O}_3 \cdot \text{H}_2\text{O}$; 306.—A white powder; deliquescent on exposure to air; odorless, or nearly so; sweetish taste; faintly alkaline reaction. Made by decomposing lithium carbonate with salicylic acid.

AMMONIUM. NH_4 .

AQUA AMMONIÆ, U. S.—Ammonia Water.—A colorless, transparent liquid; very pungent odor; acrid, alkaline taste; strongly alkaline reaction, consisting of an aqueous solution of ammonia (NH_3), containing 10 per cent. by weight of the gas. Made by mixing ammonium chloride with milk of lime, and distilling over the gas into distilled water. The reaction is as follows:—

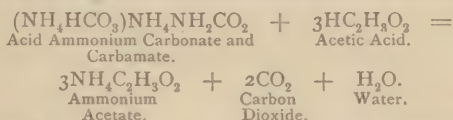


AQUA AMMONIÆ FORTIOR, U. S.—Stronger Ammonia Water,—2S per cent. by weight aqueous solution NH_3 . Specific gravity 0.900.

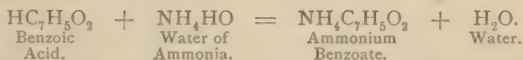
SPIRITUS AMMONIÆ, U. S.—Spirit of Ammonia.—An alcoholic solution of ammonia containing 10 per cent. by weight of the gas.

SPIRITUS AMMONIÆ AROMATICUS, U. S.—Aromatic Spirit of Ammonia.—An aromatic hydro-alcoholic solution of ammonium carbonate. (See Spiritus, Part II.)

LIQUOR AMMONII ACETATIS, U. S.—Solution of Ammonium Acetate. (*Spirit of Mindererus*).—A clear, colorless liquid, free from empyreuma; mildly saline taste; neutral, or slightly acid reaction. Made by mixing solution of acetic and ammonium carbonate.



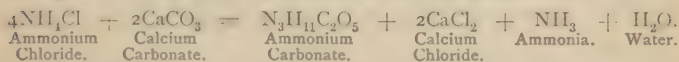
AMMONII BENZOAS, U. S.—Ammonium Benzoate. $\text{NH}_4\text{C}_7\text{H}_5\text{O}_2$; 139.—Thin, white, four-sided, laminar crystals; permanent in the air; slight odor of benzoic acid; saline, bitter, afterward slightly acid taste; neutral reaction. Made by dissolving benzoic acid in water of ammonia.



AMMONII BROMIDUM, U. S.—Ammonium Bromide. NH_4Br ; 97.8.—Colorless, transparent, prismatic crystals, or a white granular salt, becoming yellow on exposure to air; odorless, pungent, saline taste; neutral reaction. Made by adding water of ammonia, gradually, to bromine under water. (Pile's Process.)



AMMONII CARBONAS, U. S.—Ammonium Carbonate. $\text{NH}_4\text{HCO}_3\cdot\text{NH}_4\text{NH}_2\text{CO}_2$, or $\text{N}_3\text{H}_{11}\text{C}_2\text{O}_5$; 157.—White, translucent masses, consisting of bicarbonate (acid carbonate) of ammonium and carbamate of ammonium, losing both ammonia and carbonic acid gas on exposure to air, becoming opaque and finally converted into friable, porous lumps or white powder (acid carbonate of ammonia); pungent, ammoniacal odor, free from empyreuma; sharp, saline taste; alkaline reaction. Made by subliming a mixture of ammonium chloride and calcium carbonate.

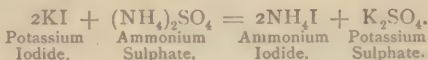


AMMONII CHLORIDUM, U. S.—Ammonium Chloride. NH_4Cl ; 53.4. (*Sal Ammoniac*).—A snow-white crystalline powder, per-

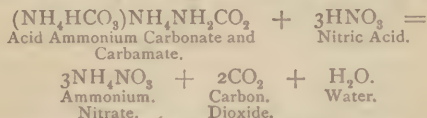
manent in the air; odorless; cooling, saline taste; slightly acid reaction. Made by subliming a mixture of ammonium sulphate and sodium chloride.

This salt is chiefly made from the gas liquor from gas works.

AMMONII IODIDUM, U. S.—Ammonium Iodide. NH_4I ; 144.6.—A white, granular salt, or minute, crystalline cubes; very deliquescent and soon becoming yellow or yellowish brown on exposure to air; odorless when white, but emitting a slight odor of iodine when colored; sharp, saline taste; neutral reaction. Made by mixing solutions of potassium iodide and ammonium sulphate.



AMMONII NITRAS, U. S.—Ammonium Nitrate. NH_4NO_3 ; 80.—Colorless crystals, generally in the form of long, thin, rhombic prisms, or fused masses; somewhat deliquescent; odorless; sharp, bitter taste; neutral reaction. Made by treating ammonium carbonate with nitric acid.



AMMONII VALERIANAS, U. S.—Ammonium Valerianate. $\text{NH}_4\text{C}_5\text{H}_9\text{O}_2$; 119.—Colorless, or white, quadrangular plates, deliquescent in moist air; valerianic acid odor; sharp and sweetish taste; neutral reaction. Made by passing ammonia gas into monohydrated valerianic acid.

The salt found in commerce is, usually, the acid salt, and should be neutralized with ammonia when used in solution for making preparations.

LINIMENTUM AMMONIÆ, U. S.—Ammonia Liniment. 30 p. AmH_2O , 70 p. Cotton seed Oil. (See Linimenta, Part II.)

TROCHISCI AMMONII, U. S.—Troches of Ammonium Chloride. 2 grains each. (See Trochisci, Part II.)

MAGNESIUM, CALCIUM AND BARIUM.

BARIUM. Ba; 136.8.

BARII DIOXIDUM, U. S.—Barium Dioxide. BaO_2 ; 168.82. (*Barium Peroxide*).—Commercial, anhydrous Barium Dioxide. A heavy grayish white, or pale yellowish-white, amorphous, coarse powder; odorless and tasteless. When exposed to the air, it slowly attracts moisture and carbon dioxide, and is gradually decomposed. Almost insoluble in cold water, with which, however, it forms a definite hydrate, and to which it imparts a decidedly alkaline reaction. Hydrochloric, phosphoric, and most other mineral acids decompose it, producing the corresponding barium salts, and hydrogen dioxide, which remains in solution for a considerable time, if the reaction has taken place in the cold, and an excess of the acid is present.

PREPARATION: Aqua Hydrogenii Dioxidi.

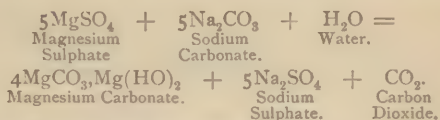
MAGNESIUM. Mg; 24.

MAGNESIA, U. S.—Magnesia. MgO ; 40. (*Light Magnesia.*)—A white, very light and fine powder, slowly absorbing carbonic acid from the air; odorless; an earthy, but no saline, taste; faintly alkaline reaction when moistened with water. Made by calcining light magnesium carbonate.



MAGNESIA PONDEROSA, U. S.—Heavy Magnesia. MgO ; 40.—A white, dense and very fine powder, corresponding, in all other properties and reactions, with magnesia. Made by calcining heavy magnesium carbonate.

MAGNESII CARBONAS, U. S.—Magnesium Carbonate. $(\text{MgCO}_3)_4 \cdot \text{Mg}(\text{HO})_2 \cdot 5\text{H}_2\text{O}$; 484.—Light, white, friable masses, or a light, white powder; odorless; tasteless; feebly alkaline reaction. Made by double decomposition between magnesium sulphate and sodium carbonate.



The process for making light magnesium carbonate differs in nothing from the above, except that it is made with a cold dilute solution instead of a concentrated boiling solution, thus illustrating the general rule in precipitation, that dilute solutions produce light precipitates, and dense solutions heavy precipitates.

MAGNESII CITRAS EFFERVESCENS, U. S.—Effervescent Magnesium Citrate.—A white, coarsely-granular salt, deliquescent on exposure to air; odorless; mildly acidulous, refreshing taste; acid reaction. Made from magnesium carbonate, citric acid, sodium bicarbonate, sugar, alcohol and distilled water. The carbonate of magnesia and part of the citric acid are rubbed together in the form of a thick paste, with distilled water, dried and powdered. The sugar, bicarbonate of sodium and the remainder of the citric acid, previously reduced to a fine powder, are then mixed with it. The mass is then dampened with alcohol and rubbed into a coarse, granular powder, through a sieve.

MAGNESII SULPHAS, U. S.—Magnesium Sulphate. $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$; 246. (*Epsom Salt*)—Small, colorless, right rhombic prisms, or acicular needles, slowly efflorescent in dry air; odorless; cooling, saline and bitter taste; neutral reaction. Made by treating native magnesium hydrate with sulphuric acid.

Native magnesium hydrate is found in the United States, and is a silicious hydrate, practically free from lime. The mineral is treated with the acid, dried, and calcined, in order to convert into red oxide any ferrous sulphate which may be present. It is then dissolved in water, and calcium sulphide

added to separate any remaining portion of iron. Purified by recrystallization.

Dolomite, the double carbonate of magnesium and calcium, is used in England for preparing Epsom salts. The carbon dioxide is driven off by heat, converting the residue into hydrates, which are treated with HCl. The calcium chloride formed by this reaction is dissolved out from the magnesium salt with water, and the latter converted into sulphate by treating it with sulphuric acid.

LIQUOR MAGNESII CITRATIS, U. S.—Solution of Magnesium Citrate.—Made by dissolving magnesium carbonate in citric acid, flavoring and adding potassium bicarbonate.

MISTURA MAGNESIÆ ET ASAFÆTIDÆ, U. S.—Mixture of Magnesia and Asafœtida.—(Popularly known as Dewees' Carminative.) Contains magnesia, tincture of asafœtida and opium, sugar and water. (See *Misturæ*, Part II.)

TROCHISCI MAGNESIÆ, U. S.—Troches of Magnesia.—Three grains each. (See *Trochisci*, Part II.)

CALCIUM. Ca; 40.

CALX, U. S.—Lime. CaO ; 56.—Hard, white, or grayish-white, masses, gradually attracting moisture and carbonic acid gas on exposure to air, and falling to a white powder; odorless; sharp, caustic taste; alkaline reaction. Made by calcining chalk or limestone.

LIQUOR CALCIS, U. S.—Solution of Lime. (*Lime Water*).—A clear, colorless liquid; specific gravity 1.0015 at 15°C . (59°F .); odorless; saline, and feebly caustic taste; alkaline reaction. Made by dissolving lime in water. Contains about 0.15 per cent. of hydrate of calcium.

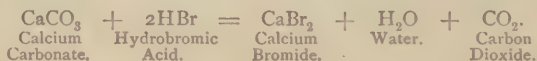
SYRUPUS CALCIS, U. S.—Syrup of Lime.—A saccharine solution of lime. (See *Syrupi*, Part II.)

LINIMENTUM CALCIS, U. S.—Lime Liniment.—Equal parts of lime water and cotton-seed oil. Sometimes called Carron Oil. (See *Linimenta*, Part II.)

CALX CHLORATA, U. S.—Chlorinated Lime.—(See Chlorine, Part II.)

CALX SULPHURATA, U. S.—Sulphurated Lime.—A grayish-white, or yellowish-white powder, gradually altered by exposure to air, exhaling a faint odor of hydrosulphuric acid; offensive, alkaline taste; alkaline reaction. A mixture consisting chiefly of sulphide of calcium (CaS) and sulphate of calcium (CaSO_4), in varying proportions, but containing not less than 36 per cent. of absolute sulphide of calcium. Made by heating lime and sulphur to a low red heat.

CALCII BROMIDUM, U. S.—Calcium Bromide.— CaBr_2 ; 199.6.—A white, granular salt; very deliquescent; odorless; pungent, saline and bitter taste; neutral reaction. Made by dissolving lime in hydrobromic acid.



CALCII CARBONAS PRÆCIPITATUS, U. S.—Precipitated Calcium Carbonate. CaCO_3 ; 100.—A very fine, white, impalpable powder, permanent in the air; odorless and tasteless. Made by double decomposition between calcium chloride and sodium carbonate.

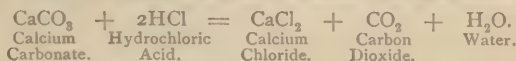


Precipitated calcium carbonate is also known as Precipitated Chalk.

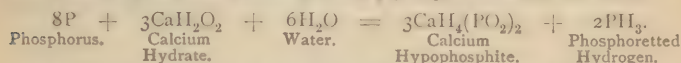
CRETA PRÆPARATA, U. S.—Prepared Chalk.—A white, amorphous powder, generally agglutinated in the form of small cones, permanent in the air; odorless and tasteless.

Prepared chalk is made from the native friable carbonate of calcium (CaCO_3), freed from most of its impurities by elutriation. (See Elutriation, Part I.)

CALCII CHLORIDUM, U. S.—Calcium Chloride. CaCl_2 ; 110.8.—Colorless, slightly translucent, hard and friable masses, very deliquescent; odorless; hot, sharp, saline taste; neutral, or faintly alkaline reaction. Made by acting on calcium carbonate with hydrochloric acid.



CALCII HYPOPHOSPHIS, U. S.—Calcium Hypophosphite. $\text{CaH}_4(\text{PO}_2)_2$; 170.—Colorless or white, six-sided prisms, or thin, flexible scales, of a pearly lustre, permanent in dry air; odorless; nauseous, bitter taste; neutral reaction. Made by heating phosphorus with milk of lime.



It is necessary to provide for the safe escape of the phosphoretted hydrogen gas evolved in this reaction, by conducting it, by a hood, into a powerful draught. No higher heat than 85°C . (185°F .) should be used, for fear of explosion.

SYRUPUS HYPOPHOSPHITUM, U. S.—Syrup of Hypophosphites. (See Syrupi, Part II.)

SYRUPUS HYPOPHOSPHITUM CUM FERRO, U. S.—Syrup of Hypophosphites with Iron. (See Syrupi, Part II.)

CALCII PHOSPHAS PRÆCIPITATUS, U. S.—Precipitated Calcium Phosphate. $\text{Ca}_3(\text{PO}_4)_2$; 310.—A light, white, amorphous powder, permanent in the air; odorless and tasteless. Made by treating bone ash with HCl , and precipitating it with ammonia.

CALCII SULPHAS EXSICCATUS, U. S.—Dried Calcium Sulphate. (*Dried Gypsum*.)—A powder containing about 95 per cent., by weight, of Calcium Sulphate ($\text{CaSO}_4 = 135.73$), and about 5 per cent. of Water; prepared from the purer varieties of native gypsum ($\text{CaSO}_4 + 2\text{H}_2\text{O} = 171.65$), by carefully heating until about three-fourths of the water has been expelled. Occurring as a fine, white powder, without odor or taste. Keep dry.

SYRUPUS CALCII LACTOPHOSPHATIS, U. S.—Syrup of Calcium Lactophosphate.—Saccharine solution of calcium lactophosphate. (See Syrupi, Part II.)

PULVIS CRETÆ COMPOSITUS, U. S.—Compound Chalk Powder.—Prepared chalk, 30 p.; Powdered acacia, 20 p.; Powdered sugar, 50 p. Used for making chalk mixture.

MISTURA CRETÆ, U. S.—Chalk Mixture.—Compound chalk powder, 20 p.; Water and cinnamon water, each 40 p.

TROCHISCI CRETÆ, U. S.—Troches of Chalk.—Each four gains. (See Trochisci, Part II.)

STRONTIUM. Sr. 87.3.

STRONTII BROMIDUM, U. S.—Strontium Bromide. $\text{SrBr}_2 + 6\text{H}_2\text{O} = 354.58$. Colorless, transparent, hexagonal crystals; odorless, and having a bitter, saline taste. Very deliquescent. Soluble in 1.05 parts of water at 15°C . (59°F .), and in 0.5 parts of boiling water. It is readily soluble in alcohol.

STRONTII IODIDUM, U. S.—Strontium Iodide. $\text{SrI}_2 + 6\text{H}_2\text{O} = 448.12$. Colorless, transparent, hexagonal plates; odorless, and having a bitterish saline taste. Deliquescent, and colored yellow by exposure to light and air. Soluble in 0.6 part of water at 15°C . (59°F .), and in 0.27 part of boiling water. Also soluble in alcohol.

STRONTII LACTAS, U. S.—Strontium Lactate. $\text{Sr}(\text{C}_3\text{H}_5\text{O}_3)_2 + 3\text{H}_2\text{O} = 318.76$. A white, granular powder, or crystalline nodules; odorless, and having a slightly bitter, saline taste. Permanent in the air.

Soluble in about 4 parts water at 15°C . (59°F .), and in less than 0.5 part of boiling water. Soluble in alcohol.

ZINC, ALUMINIUM, CERIUM AND CADMIUM.

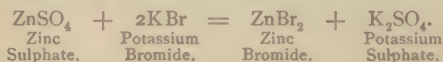
ZINCUM, U. S.—ZINC. Zn; 64.9.

Metallic zinc, in the form of thin sheets, or irregular, granulated pieces. Prepared by roasting calamine (impure carbonate) with charcoal, and collecting the zinc vapors in water. A bluish-white metal.

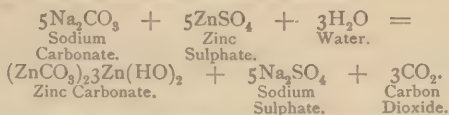
ZINCI ACETAS, U. S.—Zinc Acetate. $\text{Zn}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$; 236.9.—Soft, white, micaceous or pearly, six-sided tablets or scales, somewhat efflorescent in dry air; faintly acetous odor; sharp, metallic taste; slightly acid reaction. Made by heating zinc oxide with acetic acid.



ZINCI BROMIDUM, U. S.—Zinc Bromide. ZnBr_2 ; 224.5.—A white, or nearly white, granular powder, very deliquescent; odorless; sharp, saline and metallic taste; neutral reaction. Made by double decomposition of zinc sulphate and potassium bromide.



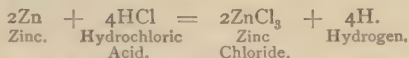
ZINCI CARBONAS PRÆCIPITATUS, U. S.—Precipitated Zinc Carbonate. $(\text{ZnCO}_3)_2 \cdot 3\text{Zn}(\text{HO})_2$; 546.5.—A white, impalpable powder, permanent in the air; odorless and tasteless. Made by double decomposition of zinc sulphate and sodium carbonate.



Conduct at boiling heat, to prevent loss by the action of the CO_2 on the neutral carbonate, which occurs if cold solutions are used.

ZINCI CHLORIDUM, U. S.—Zinc Chloride. ZnCl_2 ; 135.7.—A white crystalline powder, or white, opaque pieces, very deliquescent; odorless; very caustic, saline and metallic taste; acid reaction. Made by evaporating the officinal solution of chloride of zinc.

LIQUOR ZINCI CHLORIDI, U. S.—Solution of Zinc Chloride. (*Burnett's Disinfecting Fluid.*)—An aqueous solution of ZnCl_2 containing about 50 per cent. of the salt. Made by heating zinc with hydrochloric acid.



ZINCI IODIDUM, U. S.—Zinc Iodide. ZnI_2 ; 318.1.—A white, or nearly white, granular powder, very deliquescent; odorless; sharp, saline and metallic taste; acid reaction. Made by digesting zinc with iodine diffused in water.

ZINCI OXIDUM, U. S.—Zinc Oxide. ZnO ; 80.9.—A soft, pale yellowish, nearly white powder, permanent in the air; odorless and tasteless. Made by calcining zinc carbonate.

On the large scale, this salt is made by heating calamine and coal together, and separating the impurities by blowing the mixed vapors up a large tower, allowing the heavier particles to subside, and then by a powerful draught blowing outside into a room containing muslin bags, where it is deposited.

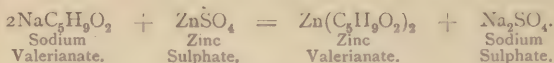
UNGUENTUM ZINCI OXIDI, U. S.—Zinc Oxide Ointment. (See Unguenta, Part II.)

ZINCI PHOSPHIDUM, U. S.—Zinc Phosphide. Zn_3P_2 ; 256.7. Minutely crystalline, friable fragments, having a metallic lustre on the fractured surface, or a grayish-black powder; permanent in the air; faint odor and taste of phosphorus. Made by passing vapors of phosphorus over fused zinc in a current of dry hydrogen.

ZINCI SULPHAS, U. S.—Zinc Sulphate. $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$; 286.9.—Small, colorless, right-rhombic prisms, or acicular needles, slowly efflorescing in dry air; odorless; sharp, saline, nauseous and metallic taste; acid reaction. Made by acting on zinc with diluted sulphuric acid.



ZINCI VALERIANAS, U. S.—Zinc Valerianate. $\text{Zn}(\text{C}_5\text{H}_9\text{O}_2)_2 \cdot \text{H}_2\text{O}$; 284.9.—Soft, white, pearly scales, permanent in the air; faint odor of valerianic acid; sweet, afterward styptic and metallic taste; acid reaction. Made by double decomposition of zinc sulphate and sodium valerianate.

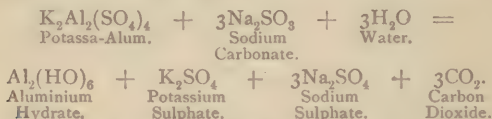


ALUMINIUM. Al; 27.

ALUMEN, U. S.—Alum. (*Aluminii et Potassii Sulphas. Pharm. 1870. Potassa-Alum.*) $\text{K}_2\text{Al}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$; 948.—Large, colorless, octahedral crystals, sometimes modified by cubes, acquiring a whitish coating on exposure to air; odorless; sweetish, astringent taste; acid reaction. Made by treating alum-clay with sulphuric acid and potassium sulphate.

ALUMEN EXSICCATUM, U. S.—Dried Alum. $\text{K}_2\text{Al}_2(\text{SO}_4)_4$; 516.—A white, granular powder, attracting moisture when exposed to the air; odorless; sweetish, astringent taste. Prepared by driving off the water of crystallization from alum.

ALUMINI HYDRAS, U. S.—Aluminium Hydrate. $\text{Al}_2(\text{HO})_6$; 155.84. (*Hydrated Alumina.*)—A white, light, amorphous powder, permanent in dry air; odorless and tasteless. Made by double decomposition of alum and sodium carbonate.



ALUMINI SULPHAS, U. S.—Aluminium Sulphate. $\text{Al}_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$; 628.9.—A white, crystalline powder, permanent in the air; odorless; sweetish, and afterward astringent taste; acid reaction. Made by treating aluminium hydrate with sulphuric acid, and crystallizing.

CERIUM. Ce; 141.

CERII OXALAS, U. S.—Cerium Oxalate. $\text{Ce}_2(\text{C}_2\text{O}_4)_3 \cdot 9\text{H}_2\text{O}$; 708.—A white, slightly granular powder, permanent in the air; odorless and tasteless. Made by precipitating cerium chloride with oxalic acid.

The details of the process are as follows:—

A powdered mineral, containing the metal and silicates, is decomposed with H_2SO_4 . The mass is then heated, and subsequently treated with HNO_3 and H_2S , to separate contaminating metals. Cerium chloride is now made by adding HCl , and this is precipitated by oxalic acid. This oxalate is then purified from lanthanum and didymium compounds by heating it with magnesium carbonate, to decompose the oxalates. The residue is now dissolved in HNO_3 , and the solution added to water containing a little H_2SO_4 . Ceric sulphate is produced, which is dissolved in H_2SO_4 , and sodium sulphite added to reduce it to cerous sulphate. This is collected and treated with oxalic acid, when cerium oxalate precipitates.

The presence of the two rare metals, didymium and lanthanum, greatly complicates the preparation of this salt, as they can only be separated with difficulty.

CADMIUM. Cd; III.8.

Cadmium enters into no official preparations, though it is used to some extent in medicine.

MANGANESE, IRON AND CHROMIUM.

MANGANESE. Mn; 54.

MANGANI DIOXIDUM, U. S.—Manganese Dioxide. (*Mangani Oxidum Nigrum, Pharm. 1880. Black Oxide of Manganese.*)—A heavy, grayish-black, more or less gritty powder, permanent in the air; odorless and tasteless; consisting of native crude binoxide of manganese, containing at least 66 per cent. of the pure oxide (MnO_2 ; 86).

MANGANI SULPHAS, U. S.—Manganese Sulphate. $MnSO_4 \cdot 4H_2O$; 222.—Colorless, or pale rose-colored, transparent, right-rhombic prisms; odorless; slightly bitter and astringent taste; faintly acid reaction. Made by Prof. Diehl's process. Manganese dioxide and charcoal are heated together to redness, the residue treated with sulphuric acid and again heated to redness, and the residue dissolved in water. The solution is then filtered and crystallized.

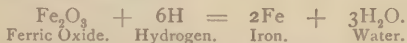
POTASSII PERMANGANAS, U. S.—Potassium Permanganate. (See Potassium.)

FERRUM, U. S.—IRON. Fe; 55.9.

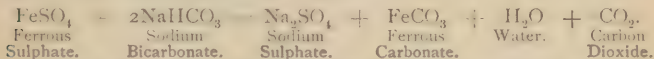
Metallic iron, in the form of fine, bright, and non-elastic wire.

FERRUM REDUCTUM, U. S.—Reduced Iron. Fe; 55.9—A very fine, grayish-black, lustreless powder, permanent in dry air; without odor or taste. Made by passing hydrogen over subcarbonate of iron, heated in a reduction tube.

The subcarbonate directed in the U. S. P. process, is more properly an oxyhydrate, and the H combines with the O to form water, and metallic iron in fine powder is left behind.



FERRI CARBONAS SACCHARATUS, U. S.—Saccharated Ferrous Carbonate. (*Saccharated Ferrous Carbonate.*)—A greenish-gray powder, gradually oxidized by contact with air; odorless; at first a sweetish, afterward a slightly ferruginous taste; neutral reaction. Made by double decomposition between ferrous sulphate and sodium bicarbonate. The precipitate is preserved with sugar.



MASSA FERRI CARBONATIS, U. S.—Mass of Ferrous Carbonate.—(*Pilula Ferri Carbonatis. Pharm., 1870.*)—Prepared by double decomposition between ferrous sulphate and sodium carbonate.

The precipitate is preserved with honey, which prevents the ferrous carbonate from oxidizing.



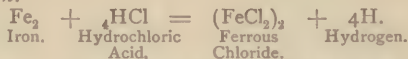
This preparation is also called Vallet's Mass. (See Massæ, Part II.)

MISTURA FERRI COMPOSITA, U. S.—Compound Iron Mixture. (See Misturæ, Part II.)

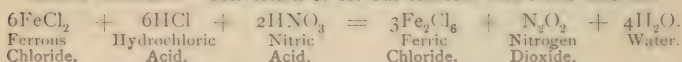
PILULÆ FERRI COMPOSITÆ, U. S.—Compound Pills of Iron. (See Pilulæ, Part II.)

FERRI CHLORIDUM, U. S.—Ferric Chloride. $\text{Fe}_2\text{Cl}_6 \cdot 12\text{H}_2\text{O}$; 540.2.—Orange-yellow, crystalline pieces, very deliquescent; odorless, or having a faint odor of hydrochloric acid; strongly styptic taste; acid reaction. Made by acting on iron with hydrochloric acid, which converts it into ferrous chloride (FeCl_2), which is converted into ferric chloride (Fe_2Cl_6) by the addition of nitric and hydrochloric acids. The reaction is as follows:—

First Reaction.—



Second Reaction.—Conversion of ferrous chloride into ferric chloride.



LIQUOR FERRI CHLORIDI, U. S.—Solution of Ferric Chloride. (*Solution of Ferric Chloride.*)—A reddish-brown liquid, consisting of an aqueous solution (with some free hydrochloric acid) of ferric chloride (Fe_2Cl_6) containing 37.10 per cent. of the anhydrous salt. It has a faint odor of hydrochloric acid; acid, strongly styptic taste; acid reaction. Prepared by oxidizing solution of ferrous chloride with nitric acid.

TINCTURA FERRI CHLORIDI, U. S.—Tincture of Ferric Chloride. (See Tincturæ, Part II.)

FERRI CITRAS, U. S.—Ferric Citrate. $\text{Fe}_2(\text{C}_6\text{H}_5\text{O}_7)_2 \cdot 6\text{H}_2\text{O}$; 597.8. Transparent, garnet-red scales, permanent in the air; odorless; very faint, ferruginous taste; acid reaction. Prepared by evaporating and scaling solution of ferric citrate.

FERRI ET AMMONII CITRAS, U. S.—Iron and Ammonium Citrate. (*Ammonio-Ferric Citrate.*)—Transparent, garnet red scales, deliquescent on exposure to damp air; odorless; saline, mildly ferruginous taste; neutral reaction. Prepared by adding water of ammonia to solution of ferric citrate, evaporating and scaling.

LIQUOR FERRI CITRATIS, U. S.—Solution of Iron Citrate. (*Solution of Ferric Citrate.*)—A dark-brown liquid; odorless; having a slightly ferruginous taste and an acid reaction; sp. gr. 1.260; consisting of an aqueous solution of ferric citrate ($\text{Fe}_2(\text{C}_6\text{H}_5\text{O}_7)_2$) containing 35.5 per cent. of the anhydrous salt. Prepared by dissolving ferric hydrate in citric acid.

The ferric hydrate is prepared by precipitating solution of tersulphate of iron with water of ammonia.



VINUM FERRI CITRATIS, U. S.—Wine of Iron Citrate.—Generally known as Wine of Iron. (See Vina, Part II.)

FERRI ET QUININÆ CITRAS, U. S.—Iron and Quinine Citrate.—Transparent, thin scales, varying in color from reddish-brown to yellowish brown, slowly deliquescent on exposure to air; odorless; bitter and mildly ferruginous taste; slightly acid reaction. Made by dissolving quinine (alkaloid) in solution of ferric citrate, evaporating and scaling.

FERRI ET QUININÆ CITRAS SOLUBILIS, U. S.—Soluble Iron and Quinine Citrate.—Thin, transparent scales of a greenish, golden-yellow color, without odor, and having a bitter, mildly ferruginous taste; deliquescent in damp air. Made by adding to a solution of citrate of iron, quinine, and citric acid, previously dissolved in distilled water, then adding sufficient ammonia water to precipitate and redissolve, evaporating and scaling on plates of glass.

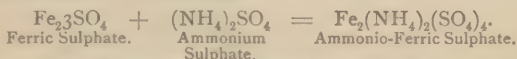
LIQUOR FERRI ET QUININÆ CITRAS, U. S.—Solution of Iron and Quinine Citrate.—A dark, greenish-yellow to yellowish-brown liquid, transparent in thin layers; odorless; bitter and mildly ferruginous taste; slightly acid reaction. Made by adding to a solution of citrate of iron and ammonium citric acid and quinine.

VINUM FERRI AMARUM, U. S.—Bitter Wine of Iron. (See Vina, Part II.)

FERRI ET STRYCHNINÆ CITRAS, U. S.—Iron and Strychnine Citrate.—Transparent, garnet-red scales, deliquescent on exposure to air; odorless; bitter and slightly ferruginous taste; slightly acid reaction. Made by adding to a solution of citrate of iron and ammonium, citric acid and strychnine, and scaling.

SYRUPUS FERRI QUININÆ ET STRYCHNINÆ PHOSPHATUM, U. S.—Syrup of the Phosphates of Iron, Quinine and Strychnine.—Made by dissolving in an acid solution of ferric phosphate, quinine, strychnine and sugar. (See Syrupi, Part II.) This preparation is also sometimes known as *Easton's Syrup*.

FERRI ET AMMONII SULPHAS, U. S.—Ferric Ammonium Sulphate. $\text{Fe}_2(\text{NH}_4)_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$; 963.8). *Ammonio-Ferric Sulphate. Ammonio-Ferric Alum*).—Pale-violet, octahedral crystals, efflorescent on exposure to air; odorless; acid, styptic taste; slightly acid reaction. Prepared by dissolving sulphate of ammonium in solution of tersulphate of iron, evaporating and crystallizing.



FERRI ET AMMONII TARTRAS, U. S.—Iron and Ammonium Tartrate. (*Ammonio-Ferric Tartrate*).—Transparent scales,

varying in color from garnet-red to yellowish-brown, only slightly deliquescent; odorless; sweetish and slightly ferruginous taste; neutral reaction. Prepared by dissolving ferric hydrate in solution of acid ammonium tartrate, and scaling.

FERRI ET POTASSII TARTRAS, U. S.—Iron and Potassium Tartrate. (*Potassio-Ferric Tartrate*).—Transparent, garnet red scales, only slightly deliquescent; odorless; sweetish, slightly ferruginous taste; neutral reaction. Prepared by adding to ferric hydrate acid potassium tartrate and a trace of water of ammonia, and scaling.

FERRI HYPOPHOSPHIS, U. S.—Ferric Hypophosphite. $\text{Fe}_2(\text{H}_2\text{PO}_2)_6$; 501.8.—A white or grayish-white powder, permanent in the air; odorless; nearly tasteless. Made by double decomposition between calcium hypophosphite and ferrous sulphate. This is one of the hypophosphites recommended by Dr. Churchill in the treatment of phthisis.



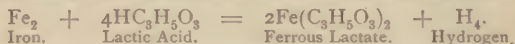
FERRI IODIDUM SACCHARATUM, U. S.—Saccharated Ferrous Iodide.—A yellowish-white or grayish powder, very hygroscopic; odorless; sweetish, ferruginous taste; slightly acid reaction. Made by adding solution of ferrous iodide to sugar of milk.

SYRUPUS FERRI IODIDI, U. S.—Syrup of Ferrous Iodide.—Made by adding solution of ferrous iodide to sugar.

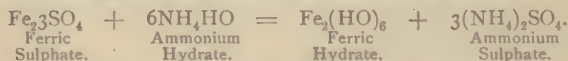
A syrupy liquid, containing 10 per cent. of FeI_2 . (See Syrupi, Part II).

PILULÆ FERRI IODIDI, U. S.—Pills of Ferrous Iodide.—Reduced iron, 0.16 gr.; iodide, 0.8 gr.; glycyrrhiza, 0.5 gr.; sugar, 0.5 gr.; extract glycyrrhiza, 0.12 gr.; acacia, 0.12 gr.; water q. s. in each pill.

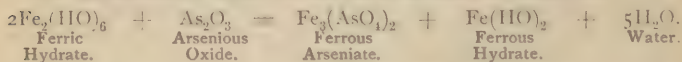
FERRI LACTAS, U. S.—Ferrous Lactate.— $\text{Fe}(\text{C}_3\text{H}_5\text{O}_3)_2 \cdot 3\text{H}_2\text{O}$; 287.9.—Pale, greenish-white, crystalline crusts, or grains, permanent in air; odorless; mild, sweetish, ferruginous taste; slightly acid reaction. Prepared by acting on iron with lactic acid, and crystallizing the solution.



FERRI OXIDUM HYDRATUM, U. S.—Ferric Hydrate. $\text{Fe}_2(\text{HO})_6$; 213.8. Frequently used as an antidote for arsenic, and prepared by adding water of ammonia to solution of tersulphate of iron, collecting and washing the precipitate. The reaction is as follows:—



The reaction occurs when it is used as an antidote as follows:—



Hydrated oxide of iron should not be retained for any length of time on

hand, because it decomposes even when kept under water. The ingredients, however, should always be ready for immediate use, weighed out in suitable bottles, and kept in an accessible and well-known place, ready for instant use in case of emergency.

FERRI OXIDUM HYDRATUM CUM MAGNESIA, U. S.—**Ferric Hydrate with Magnesia.**—Prepared by mixing solution of tersulphate of iron with magnesia mixture. (Magnesia mixed with water.)

This preparation is to be preferred to the above as an antidote for arsenic, as it is not necessary to wash the precipitate, and the reaction that occurs leaves in solution sulphate of magnesium, which acts as a cathartic, and carries off the ferrous arseniate formed.

The solutions for making hydrated oxide of iron with magnesia are prepared as follows: Take of solution of tersulphate of iron 1000 grains; mix it with twice its weight (or volume) of water, and keep the mixture in a well-stoppered bottle, marked No. 1. Rub 150 grains of magnesia with water to a smooth, thin mixture; transfer this to a bottle capable of holding one quart, and fill it up with water. Label this No. 2. When the preparation is wanted for use, mix the two liquids by adding the magnesia mixture (No. 2) gradually to the iron solution (No. 1), and shake them together until a homogeneous mass results. Give of this *ad libitum*.

TROCHISCI FERRI, U. S.—**Troches of Iron.**—Each contains five grains of dried ferric hydrate. (See Trochisci, Part II.)

EMPLASTRUM FERRI, U. S.—**Plaster of Iron.**—(See Emplastra, Part II.)

FERRI PHOSPHAS SOLUBILIS, U. S.—**Soluble Ferric Phosphate.**—Thin, bright green, transparent scales, permanent in dry air when excluded from light, but turning dark on exposure to light; odorless; acidulous, slightly saline taste; slightly acid reaction. Prepared by mixing solutions of citrate of iron and phosphate of sodium, evaporating in scales.

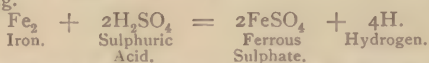
This is not a definite chemical compound, but is sometimes termed sodio-ferric, citrate-phosphate, and greatly resembles the officinal ferric pyrophosphate. It is a scaled salt, and quite different from the insoluble slate-colored powder of phosphate of iron, formerly officinal.

FERRI PYROPHOSPHAS SOLUBILIS, U. S.—**Soluble Ferric Pyrophosphate.**—Thin, apple-green, transparent scales, permanent in dry air when excluded from light, but turning dark on exposure to light; odorless; acidulous, slightly saline taste; slightly acid reaction. Made by mixing solutions of citrate of iron and pyrophosphate of sodium, evaporating in scales.

The compound is a mixture of several salts, and not a definite chemical compound. It consists of sodio-ferric pyrophosphate, sodio-ferric citrate, and ferric sulphate. It differs from the salt formerly officinal, which was an insoluble ferric phosphate $\text{Fe}_4\text{P}_2\text{O}_7$, dissolved in solution of ammonia citrate. It also differs from that insoluble gelatinous precipitate, sometimes formed when tincture of chloride of iron is added to dilute phosphoric acid. This is also a pyrophosphate of iron.

FERRI SULPHAS, U. S.—**Ferrous Sulphate.** $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$; 277.9.—Large, pale, bluish-green, monoclinic prisms, efflorescent, and absorbing oxygen on exposure to air; odorless; saline, styptic taste; acid

reaction. Made by treating iron with diluted sulphuric acid, evaporating and crystallizing.



FERRI SULPHAS EXSICCATUS, U. S.—Dried Ferrous Sulphate. $2\text{FeSO}_4 : 3\text{H}_2\text{O} = 357.28 ; 2.9$. A grayish-white powder prepared by exsiccating ferrous sulphate at a temperature not above 149°C (300°F .), and still containing about 15 per cent. water of crystallization.

FERRI SULPHAS GRANULATUS, U. S.—Granulated Ferrous Sulphate. (*Ferri Sulphas Precipitatus*, Pharm. 1880.) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$; 277.42. A very pale, bluish-green, crystalline powder, efflorescent in dry air, but when in contact with moisture, becoming gradually oxidized; odorless; saline, styptic taste; acid reaction. Made by precipitating an aqueous solution of ferrous sulphate with alcohol.

PILULÆ ALOES ET FERRI, U. S.—Pills of Aloes and Iron. (See *Pilulæ*, Part II.)

FERRI VALERIANAS, U. S.—Ferric Valerianate. $\text{Fe}_2(\text{C}_5\text{H}_9\text{O}_2)_6$; 717.8.—A dark, tile-red, amorphous powder, permanent in dry air; faint odor of valerian; acid, mildly styptic taste. Prepared by double decomposition, between ferric sulphate and sodium valerianate.

LIQUOR FERRI ACETATIS, U. S.—Solution of Ferric Acetate.—A dark, red-brown, transparent liquid; acetous odor; sweetish, faintly styptic taste; slightly acid reaction. An aqueous solution of ferric acetate ($\text{Fe}_2(\text{C}_2\text{H}_3\text{O}_2)_6$) containing 33 per cent. of the anhydrous salt. Prepared by dissolving ferric hydrate in glacial acetic acid.

TINCTURA FERRI ACETATIS, U. S.—Tincture of Ferric Acetate. (*Tincture of Ferric Acetate*.) (See *Tincturæ*, Part II.)

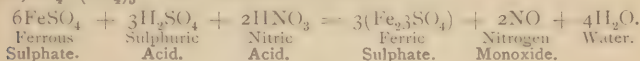
MISTURA FERRI ET AMMONII ACETATIS, U. S.—Mixture of Acetate of Iron and Ammonium. (See *Misturæ*, Part II.) This preparation is also known as *Basham's Mixture*.

LIQUOR FERRI NITRATIS, U. S.—Solution of Ferric Nitrate. (*Solution of Ferric Nitrate*.)—A transparent, amber colored, or reddish liquid, without odor, having an acid, strongly styptic taste, and an acid reaction; specific gravity 1.050. Made by dissolving ferric hydrate in dilute nitric acid.

LIQUOR FERRI SUBSULPHATIS, U. S.—Solution of Ferric Subsulphate. (*Solution of Basic Ferric Sulphate*. *Monsel's Solution*.)—A dark, reddish-brown, almost syrupy liquid; specific gravity 1.555; odorless, or nearly so; extremely astringent taste, free from causticity; acid reaction. Made by heating ferrous sulphate in a mixture of sulphuric and nitric acid. An aqueous solution, containing 43.7 per cent. of $\text{Fe}_2\text{O}(\text{SO}_4)_3$.

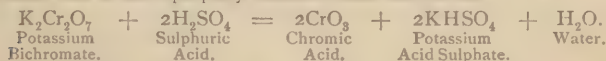
LIQUOR FERRI TERSULPHATIS, U. S.—Solution of Ferric Sulphate. (*Solution of Normal Ferric Sulphate*.)—A dark, reddish-brown liquid; almost odorless; acid, strongly styptic taste; acid reaction. Made by heating ferrous sulphate in a mixture of nitric acid with excess of sulphuric acid.

This solution differs from the solution of subsulphate of iron, merely in containing a larger proportion of sulphuric acid. It has the specific gravity of 1.320, and is a solution of the *true* persulphate $\text{Fe}_2(\text{SO}_4)_3$, or normal ferric sulphate. Solution of persulphate of iron is the name under which Monsel's Solution is erroneously prescribed. The latter is a solution of a subsalt, $\text{Fe}_4\text{O}(\text{SO}_4)_6$. The reaction is as follows:—



CHROMIUM. Cr; 52.4.

ACIDUM CHROMICUM, U. S.—Chromic Acid. CrO_3 ; 100.4. —Small, crim-on, needle-shaped, or columnar crystals, deliquescent, having a caustic effect upon the skin and other animal tissues; odorless; acid reaction. Made by decomposing potassium bichromate with sulphuric acid. Chromic acid is more properly called *chromic anhydride*.



NICKEL, COBALT, AND TIN.

Ni; 58. Co; 58.9 Sn; 117.7.

There are no officinal preparations of these metals. Nickel has recently come into use in the form of bromide, chloride, etc., and seems to be of considerable merit. None of the unofficinal salts of cobalt are of pharmaceutical interest. Tin is of no interest pharmaceutically, but its salts are of great importance in the arts.

LEAD, COPPER, SILVER, AND MERCURY.

LEAD. Pb (Plumbum); 206.5.

Lead is obtained by roasting the native sulphide, *Galena*. It is a heavy, soft, bluish metal, with a specific gravity of 11.45.

Lead and its compounds are poisonous; and as this metal is used to a large extent in the manufacture of water-pipes, the effect of water on lead is of interest. Pure water is a solvent of lead to a certain extent, owing to the formation of a slightly soluble hydroxide or carbonate. The purer the water the more dangerous it is in this way. If traces of sulphates or chlorides be present in the water, however, an insoluble coating is formed on the surface of the metal, which protects it from further decomposition.

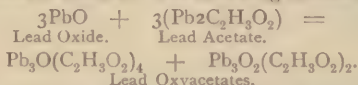
PLUMBI ACETAS, U. S.—Lead Acetate. $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$; 378.5. (*Sugar of Lead*).—Colorless, shining, transparent, prismatic crystals or scales; efflorescent and attracting carbonic acid on exposure to air; faintly acetous odor; sweetish, astringent, afterward metallic, taste; faintly acid reaction. Made by treating lead oxide with acetic acid, evaporating and crystallizing.



The commercial salt is unfit for use, because it usually contains carbonate and oxide of lead.

LIQUOR PLUMBI SUBACETATIS, U. S.—Solution of Lead Subacetate. (*Goulard's Extract.*)—A clear, colorless liquid, of a sweetish, astringent taste and an alkaline reaction; sp. gr. 1.228. Made by boiling solution of lead acetate with lead oxide.

The subacetate is not a definite salt, but as found in officinal solutions, it is a mixture of oxyacetates, produced by boiling the normal acetate in water in contact with the oxide. The following reaction occurs:—



LIQUOR PLUMBI SUBACETATIS DILUTUS, U. S.—Diluted Solution of Lead Subacetate. (*Lead Water.*)—Made by diluting 3 parts of solution of subacetate of lead with 97 parts of water.

The opalescence of lead-water is due to the formation of a trace of carbonate if the distilled water used has not been recently freed from carbonic acid gas by boiling and cooling it. A few drops of acetic acid will clear it, however; but it should be dispensed opalescent, to distinguish it from lime-water, for which it has often been mistaken, with serious results.

CERATUM PLUMBI SUBACETATIS, U. S.—Cerate of Lead Subacetate. (*Goulard's Cerate.*)—20 p. Goulard's Extract; 80 p. Camphor Cerate. (See Cerata, Part II.)

LINIMENTUM PLUMBI SUBACETATIS, U. S.—Liniment of Lead Subacetate.—Goulard's Extract, 40 p.; Cottonseed Oil, 60 p. (See Linimenta, Part II.)

PLUMBI CARBONAS, U. S.—Lead Carbonate.— $(\text{PbCO}_3)_2 \cdot \text{Pb}(\text{HO})_2$; 773.5 (*White Lead.*)—A heavy, white, opaque powder or pulverulent mass, permanent in the air; odorless and tasteless. Made by acting on metallic lead with fumes of acetic acid and decaying matter.

Plumbi carbonas is a mixture of carbonate and hydrate.

UNGUENTUM PLUMBI CARBONATIS, U. S.—Ointment of Lead Carbonate.—Lead Carbonate, 10 p.; Benzoated Lard, 90 p. (See Unguenta, Part II.)

PLUMBI IODIDUM, U. S.—Lead Iodide. PbI_2 ; 459.7.—A heavy, bright, citron yellow powder, permanent in the air; odorless; tasteless; neutral reaction. Made by double decomposition between lead nitrate and potassium iodide.



UNGUENTUM PLUMBI IODIDI, U. S.—Ointment of Lead Iodide.—Lead Iodide, 10 p.; Benzoated Lard, 90 p. (See Unguenta, Part II.)

PLUMBI NITRAS, U. S.—Lead Nitrate. $\text{Pb}_2(\text{NO}_3)_2$; 330.5.—Colorless, transparent, or white, nearly opaque, octahedral crystals, permanent in the air; odorless, sweetish, astringent, afterward metallic, taste; acid reaction. Made by treating lead oxide with diluted nitric acid, evaporating and crystallizing.

PLUMBI OXIDUM, U. S.—Lead Oxide. PbO ; 222.5. (*Litharge*.)

—A heavy, yellowish or reddish-yellow powder, or minute scales, permanent in the air; odorless; tasteless. Made by roasting lead ore.

Red Lead is a higher oxide, Pb_3O_4 . Made by sprinkling hot litharge (PbO) with water, powdering, drying and heating out of contact with air.

EMPLASTRUM PLUMBI, U. S.—Lead Plaster.—Made by boiling lead with olive oil and water. The lead combines with the fatty acids of the oil and forms an oleo-palmitate of lead, setting free glyceryl, which unites with the water present to form hydrate of glyceryl, or glycerin. (See *Emplastra*, Part II.)

UNGUENTUM DIACHYLON, U. S.—Diachylon Ointment.—Made by diluting lead plaster with olive oil and perfuming with oil of lavender. (See *Unguenta*, Part II.)

COPPER. Cu ; 63.2.**CUPRI ACETAS.**—Copper Acetate. $Cu(C_2H_3O_2)_2 \cdot H_2O$; 199.2.

—Dark-green, prismatic crystals, yielding a bright green powder, efflorescent on exposure to air; odorless; nauseating, metallic taste; acid reaction. Made by treating copper with acetic acid, and crystallizing. It is a cupric salt, and is commonly called *verdigris*.

CUPRI SULPHAS, U. S.—Copper Sulphate. $CuSO_4 \cdot 5H_2O$; 249.2.—Large, transparent, deep-blue, triclinic crystals; efflorescent; odorless; nauseous, metallic taste; acid reaction. Commonly called *blue vitriol*.

SILVER. Ag ; 107.7.

A brilliant, white metal, very malleable and ductile, having a specific gravity of 10.4 to 10.5.

ARGENTI CYANIDUM, U. S.—Silver Cyanide. $AgCN$; 133.7.

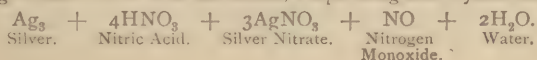
—A white powder, permanent in dry air, but gradually turning brown by exposure to light; odorless and tasteless. Made by passing hydrocyanic gas into solution of silver nitrate, or by mixing solutions of silver nitrate with potassium cyanide.

**ARGENTI IODIDUM, U. S.**—Silver Iodide. AgI ; 234.3.—

A heavy, amorphous, light-yellowish powder, unaltered by light if pure, but generally becoming somewhat greenish-yellow; odorless and tasteless. Made by double decomposition between potassium iodide and silver nitrate.

**ARGENTI NITRAS, U. S.**—Silver Nitrate. $AgNO_3$; 169.7.—

Colorless, transparent, tabular, rhombic crystals, becoming gray or grayish-black on exposure to light in the presence of organic matter; odorless; bitter, caustic, and strongly metallic taste; neutral reaction. Made by treating metallic silver with nitric acid, evaporating and crystallizing.

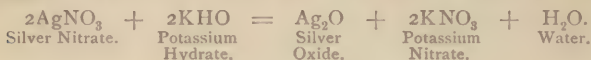


ARGENTI NITRAS DILUTUS, U. S.—Diluted Silver Nitrate.—Equal parts of nitrate of silver and nitrate of potassium, melted and moulded.

ARGENTI NITRAS FUSUS, U. S.—Moulded Silver Nitrate.—Made by fusing and moulding silver nitrate in the form of points or cones.

A white, hard, solid, generally in the form of pencils or cones, of a fibrous fracture, becoming gray, or grayish-black on exposure to light in presence of organic matter; odorless; bitter, caustic, and strongly metallic taste; neutral reaction. The official process calls for a small portion of HCl , which is added to give greater toughness to the pencils.

ARGENTI OXIDUM, U. S.—Silver Oxide. Ag_2O ; 231.4.—A heavy, dark, brownish black powder, liable to reduction by exposure to light; odorless; metallic taste; imparting alkaline reaction to water. Made by precipitating solution of silver nitrate with solution of potassium hydrate.



MERCURY. Hg; 199.7.

HYDRARGYRUM, U. S.—Mercury. Hg; 199.7. (Quick-silver.)—A shining, silver white metal, liquid at temperatures above— 40°C . (-40°F .); odorless and tasteless.

Mercury may be purified from mechanical impurities by squeezing it through chamois, or by distillation with HCl , after which the HCl is washed out with distilled water, and the mercury dried by the aid of filtering paper and a water bath.

HYDRARGYRUM CUM CRETA, U. S.—Mercury with Chalk.—Made by extinguishing 38 p. Hg with 12 p. sugar of milk and 50 p. prepared chalk.

EMPLASTRUM HYDRARGYRI, U. S.—Mercurial Plaster.—Made by extinguishing 30 p. Hg, 10 p. melted resin and olive oil, and incorporating with 50 p. melted lead plaster. (See Emplastra, Part II.)

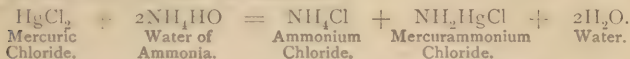
EMPLASTRUM AMMONIACI CUM HYDRARGYRO, U. S.—Ammoniac Plaster with Mercury.—Made by extinguishing 18 per cent. of Hg with ammonia, olive oil, sublimed sulphur, diluted acetic acid and lead plaster. (See Emplastra, Part II.)

MASSA HYDRARGYRI, U. S.—Mass of Mercury.—Made by extinguishing 33 p. Hg with honey of rose and glycerine, adding powdered glycyrrhiza and powdered althæa. (See Massæ, Part II.)

UNGUENTUM HYDRARGYRI, U. S.—Mercurial Ointment.—Made by extinguishing 450 p. Hg with 40 p. tr. benzoin comp. and 100 p. of Hg ointment, then adding 225 p. each, melted lard and suet. (See Unguenta, Part II.)

HYDRARGYRUM AMMONIATUM, U. S.—Ammoniated Mercury. NH_2HgCl ; 251.1. (*White precipitate. Mercurammonium Chloride.*)—White, pulverulent pieces, or a white powder, permanent in

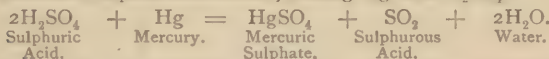
the air; odorless and tasteless. Made by precipitating solution of mercuric chloride with water of ammonia.



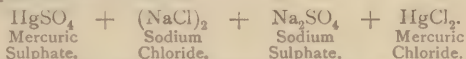
UNGUENTUM HYDRARGYRI AMMONIATI, U. S.—Ointment of Ammoniated Mercury.—Ammoniated mercury, 10 p.; benzoated lard, 90 p.

HYDRARGYRI CHLORIDUM CORROSIVUM, U. S.—Corrosive Mercuric Chloride. HgCl_2 ; 270.5. (*Corrosive Sublimate. Mercuric Chloride.*)—Heavy, colorless, rhombic crystals, or crystalline masses, permanent in the air; odorless; acrid and persistent metallic taste; acid reaction. Made by subliming mercuric sulphate with sodium chloride.

The mercuric sulphate is formed by boiling Hg with H_2SO_4 .

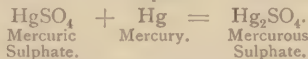
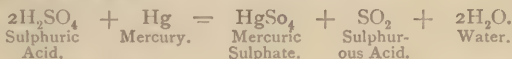


This is mixed with NaCl and sublimed. The following reaction occurs. Sodium sulphate remains behind.

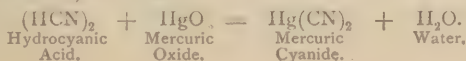


HYDRARGYRI CHLORIDUM MITE, U. S.—Mild Mercurous Chloride. Hg_2Cl_2 ; 470.2. (*Calomel. Mercurous Chloride.*)—A white, impalpable powder, permanent in the air; odorless and tasteless. Prepared by subliming mercuric sulphate and mercury with sodium chloride.

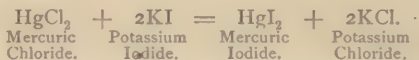
In preparing calomel, mercuric sulphate is formed in the same manner as in the preparation of corrosive sublimate; this is then triturated with a quantity of mercury equal to that used in forming it, thus producing mercurous sulphate, which is then sublimed with sodium chloride. Sodium sulphate remains behind.



HYDRARGYRI CYANIDUM, U. S.—Mercuric Cyanide. $\text{Hg}(\text{CN})_2$; 251.7. (*Mercuric Cyanide.*)—Colorless, or white, prismatic crystals, becoming colored on exposure to light; odorless; bitter, metallic taste; neutral reaction. Made by passing hydrocyanic acid into a vessel containing mercuric oxide, with water.

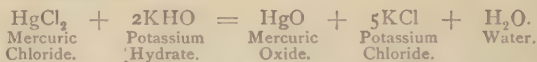


HYDRARGYRI IODIDUM RUBRUM, U. S.—Red Mercuric Iodide. HgI_2 ; 452.9. (*Biniodide of Mercury. Red Iodide of Mercury.*)—A scarlet red, crystalline powder, permanent in the air; odorless and tasteless. Made by double decomposition between mercuric chloride and potassium iodide.



HYDRARGYRI IODIDUM FLAVUM, U. S.—Yellow Mercurous Iodide. Hg_2I_2 ; 652.66. (*Hydrargyri Iodidum Viride. Pharm. 1880. Protiodide of Mercury. Yellow (or Green) Iodide of Mercury.*)—Bright yellow, amorphous powder. Odorless and tasteless. By exposure to the light it becomes darker, in proportion as it undergoes decomposition into metallic mercury and mercuric iodide. Made by rubbing together mercury and iodine and adding alcohol. Alcohol is added to keep down the temperature by its evaporation, and as some HgI_2 is formed, and is soluble in alcohol, it may be washed out thereby.

HYDRARGYRI OXIDUM FLAVUM, U. S.—Yellow Mercuric Oxide. HgO ; 215.7. (*Yellow Mercuric Oxide.*)—A light, orange-yellow, heavy, impalpable powder, permanent in the air and turning darker on exposure to light.

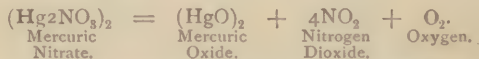


This oxide, when digested on a water-bath for fifteen minutes, with a strong solution of oxalic acid, forms mercuric oxalate of a white color, distinguishing it from red oxide.

UNGUENTUM HYDRARGYRI OXIDI FLAVI, U. S.—Ointment of Yellow Mercuric Oxide.—(Oxide, 10 p.; ointment, 90 p.)

OLEATUM HYDRARGYRI, U. S.—Oleate of Mercury.—Made by dissolving 10 p. dried yellow oxide in 90 p. oleic acid, without heat.

HYDRARGYRI OXIDUM RUBRUM, U. S.—Red Mercuric Oxide. HgO ; 215.7. (*Red Precipitate.*)—Heavy, orange-red, crystalline scales, or a crystalline powder, becoming more yellow the finer it is divided, permanent in the air; odorless and tasteless. Made by decomposing mercuric nitrate by heat.



UNGUENTUM HYDRARGYRI OXIDI RUBRI, U. S.—Ointment of Red Mercuric Oxide. Red oxide, 10 p.; mercury ointment, 90 p.

HYDRARGYRI SUBSULPHAS FLAVUS, U. S.—Yellow Mercuric Subsulphate. $\text{Hg}_2\text{HgO}_3\text{SO}_4$; 727.1. (*Basic Mercuric Sulphate. Turpeth Mineral.*)—A heavy, lemon-yellow powder, permanent in the air; odorless and almost tasteless. Made by adding mercuric sulphate to boiling water. Acid mercuric sulphate remains in solution.

HYDRARGYRI SULPHIDUM RUBRUM.—Red Mercuric Sulphide. HgS ; 231.7. (*Cinnabar*).—Brilliant, dark-red, crystalline masses, or a fine, bright, scarlet powder, permanent in the air; odorless and tasteless. Made by fusing and subliming mercury and sulphur.

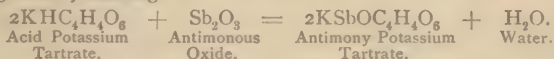
LIQUOR HYDRARGYRI NITRATIS, U. S.—Solution of Mercuric Nitrate.—A clear, nearly colorless, heavy liquid; specific gravity 2.100; faint odor of nitric acid; strongly acid reaction. Made by dissolving 40 p. red oxide with 45 p. nitric acid and 15 p. water. Contains about 50 per cent. of mercuric nitrate $\text{Hg}(\text{NO}_3)_2$ with some free nitric acid.

UNGUENTUM HYDRARGYRI NITRATIS, U. S.—Ointment of Mercuric Nitrate. (*Citrine Ointment*).—Made by treating lard oil with nitric acid, and then incorporating solution of mercuric nitrate. The olein is converted into elaidin, and the color changes to a deep orange, by the action of nitric acid on the lard oil.

ANTIMONY, ARSENIC AND BISMUTH.

ANTIMONY (STIBIUM). Sb ; 120.

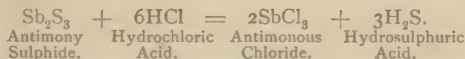
ANTIMONII ET POTASSII TARTRAS, U. S.—Antimony and Potassium Tartrate. $2\text{KSb}(\text{OC}_4\text{H}_4\text{O}_6)_2$; 664. (*Tartar Emetic*).—Small, transparent crystals of the rhombic system, becoming opaque and white on exposure to air, or a white, granular powder; sweet, afterward disagreeable metallic taste; feebly acid reaction. Made by boiling antimonous oxide and acid potassium tartrate together with water, evaporating and crystallizing.



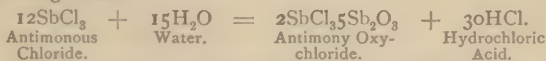
ANTIMONII OXIDUM, U. S.—Antimony Oxide. Sb_2O_3 ; 288.—A heavy, grayish-white powder, permanent in the air; odorless and tasteless. Made by adding antimonous chloride to water, and treating the oxychloride formed with water of ammonia.

The process consists of three steps, as follows:

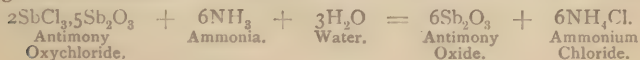
The first step is the formation of antimonous chloride SbCl_3 , with the following reaction:—



The second step consists of adding the antimonous chloride to water, oxychloride being formed.



The third step consists in converting the oxychloride into oxide, by treating it with ammonia.



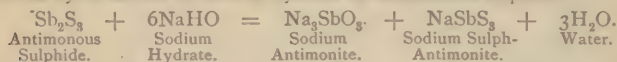
ANTIMONII SULPHIDUM, U. S.—Antimony Sulphide. Sb_2S_3 ; 336. (*Antimonii Sulphuretum. Pharm. 1870.*)—Native sulphide of antimony, purified by fusion, and as nearly free from arsenic as possible.

Steel-gray masses, of a metallic lustre, and a striated, crystalline fracture, forming a black or grayish-black, lustreless powder; odorless and tasteless.

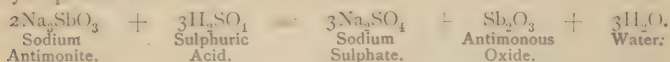
ANTIMONII SULPHIDUM PURIFICATUM, U. S.—Purified Antimony Sulphide. Sb_2S_3 ; 336.—A dark-gray powder; odorless and tasteless. Prepared by macerating antimonous sulphide with water containing a trace of water of ammonia.

ANTIMONIUM SULPHURATUM, U. S.—Sulphurated Antimony.—A reddish-brown, amorphous powder; odorless and tasteless. Made by boiling antimonous sulphide with solution of soda, and adding sulphuric acid to the hot solution.

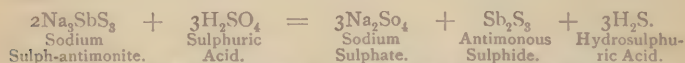
This process consists of two steps. *First*, the formation of sodium antimonite by the action of sodium hydrate on antimonous sulphide.



Second, decomposition of sodium antimonite and sodium sulph-antimonite by sulphuric acid:—



And—



PILULÆ ANTIMONII COMPOSITÆ, U. S.—Compound Pills of Antimony. (*Pummer's Pills.*)—Each contains one-half grain sulphurated antimony, one-half grain calomel, and one grain guaiac. (See *Pilulæ*, Part II.)

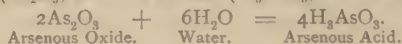
PULVIS ANTIMONIALIS, U. S.—Antimonial Powder. (*James' Powder.*)—33 p. antimonous oxide; 67 p. precipitated calcium phosphate. (See *Pulveres*, Part II.)

VINUM ANTIMONII, U. S.—Wine of Antimony.—4 p. tartar emetic; 60 p. distilled water; stronger white wine to make 1000 parts. (See *Vina*, Part II.)

ARSENIC. As; 74.9.

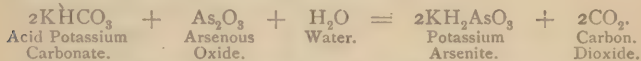
ACIDUM ARSENOSUM, U. S.—Arsenous Acid. As_2O_3 ; 197.68. (*Arsenic Trioxide. White Arsenic.*)—A heavy, white solid, occurring either as an opaque powder, or in transparent or semi-transparent masses, which usually have a striated appearance; odorless; tasteless; faintly acid reaction. Prepared by roasting arsenical ores, and resubliming the sublimate.

The oxide (As_2O_3) becomes an acid (H_3AsO_3) when added to water.



LIQUOR ACIDI ARSENOSI, U. S.—Solution of Arsenous Acid. (*Liquor Arsenici Chloridi. Pharm. 1870.*)—A solution of arsenious acid in diluted hydrochloric acid. 1 p. arsenic; 2 p. HCl; distilled water to 100 parts. No chemical reaction takes place.

LIQUOR POTASSII ARSENITIS, U. S.—Solution of Arsenite of Potassium. (*Forester's Solution.*)—1 p. arsen. acid; 1 p. KHCO_3 ; 3 p. tr. lavender comp.; distilled water to 100 parts.



When arsenous oxide is boiled with KHCO_3 in concentrated solution, potassium arsenite is produced, and CO_2 evolved. The quantity of water directed in the formula, however, is sufficient to dissolve the salts, so that a solution can be effected without any chemical change.

SODII ARSENAS, U. S.—Arsenate of Sodium. $\text{Na}_2\text{HASO}_4 \cdot 7\text{H}_2\text{O}$; 311.9—Made by fusing arsenous acid with sodium nitrate and carbonate.

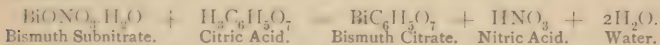
LIQUOR SODII ARSENATIS, U. S. (See Liquores, Part II.)

ARSENI IODIDUM, U. S.—Arsenic Iodide. AsI_3 ; 454.49. (*Arsenici Iodidum. Pharm. 1870.*)—Glossy, orange-red, crystalline masses, or shining, orange-red, crystalline scales, gradually losing iodine when exposed to the air; iodine-like odor; iodine-like taste; neutral reaction. Made by fusing 1 p. of arsenic and 5 p. of iodine together.

LIQUOR ARSENI ET HYDRARGYRI IODIDI, U. S.—Solution of Iodide of Arsenic and Mercury. (*Liquor Arsenici et Hydrargyri Iodidi. Pharm. 1870. Donovan's Solution.*)—Solution should be light straw-color; if darker, free iodine is probably present. (See Liquores, Part II.)

BISMUTH. Bi; 210.

BISMUTHI CITRAS, U. S.—Bismuth Citrate. $\text{BiC}_6\text{H}_5\text{O}_7$; 399.—A white, amorphous powder, permanent in the air; odorless and tasteless. Prepared by boiling bismuth subnitrate with citric acid and water, and adding distilled water to the clear solution. The reaction is as follows:—

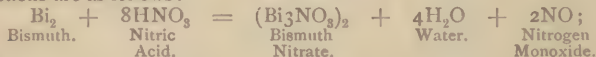


BISMUTHI ET AMMONII CITRAS, U. S.—Bismuth and Ammonium Citrate.—Small, shining, pearly or translucent scales, becoming opaque on exposure to air; odorless; slightly acidulous and metallic taste; neutral or faintly alkaline reaction. Made by dissolving bismuth citrate in water of ammonia, evaporating the solution, and scaling.

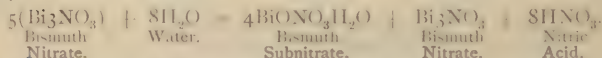
BISMUTHI SUBCARBONAS, U. S.—Bismuth Subcarbonate. $(\text{BiO})_2\text{CO}_3 \cdot \text{H}_2\text{O}$; 530.—A white, or pale, yellowish-white powder, permanent in the air; odorless and tasteless. Made by dissolving bismuth in nitric acid, purifying, and precipitating by adding solution of sodium carbonate.

The most injurious impurity in bismuth is arsenic. In the official formula, directions are carefully made to leave out the arsenic. "The bismuth is first dissolved in nitric acid, a portion of which oxidizes the metal, with evolution of nitrous vapors, while another portion combines with the oxide produced, to form a bismuth nitrate. At the same time the arsenic is also oxidized at the expense of the nitric acid, and unites with a portion of the oxidized metal, so as to produce bismuth arsenate. Both of these salts, therefore, are contained in the solution, which is very concentrated. Both have the property, when their solution is diluted with water, of separating into two salts—one an insoluble subsalt, which is deposited, and the other a soluble acid salt, which is held in solution. But the arsenate is more disposed to the change than the nitrate, and requires for the purpose a smaller amount of water of dilution. The subarsenate is slowly deposited in twenty-four hours, and is then separated by filtration. The addition of a large quantity of distilled water precipitates the bismuth subnitrate, the ammonia being added to separate it more thoroughly by combining with the nitric acid. The precipitate thus freed from arsenic is now redissolved in nitric acid, partially diluted, and added to solution of sodium carbonate; by double decomposition bismuth subcarbonate and sodium nitrate are thus produced."—(Remington.)

BISMUTHI SUBNITRAS, U. S.—Bismuth Subnitrate. $\text{BiO} \cdot \text{NO}_3 \cdot \text{H}_2\text{O}$; 306.—A heavy, white powder, permanent in the air; odorless; almost tasteless; slightly acid reaction. Prepared by dissolving bismuth in nitric acid, purifying, and adding the solution, in nitric acid, to water. The reactions are as follows:—



then,



"The separation of the arsenic is accomplished by first preparing the carbonate, by adding the solution of bismuth to a solution of sodium carbonate in excess, whereby most of the arsenic is retained in the solution, probably as sodium arsenate, while the insoluble carbonate is precipitated. This is dissolved, with the aid of heat, in nitric acid, so as to make a very concentrated solution of the nitrate, to which, when cold, just so much water is added as to begin to produce a permanent turbidness. The object of this is to allow any arsenic that may still be present to be deposited, which happens for reasons explained above. (See Subcarbonate.) The deposited matter having been precipitated, only the pure nitrate remains in solution, which is made to yield the subnitrate by a large dilution with water, and still more completely, by the addition of ammonia."—(Remington.)

GOLD AND PLATINUM.

Au; 196.2. Pt; 194.4.

AURI ET SODII CHLORIDUM, U. S.—Gold and Sodium Chloride.—An orange yellow powder, slightly deliquescent in damp air; odorless; saline, metallic taste; slightly acid reaction. A mixture com-

posed of equal parts of dry chloride of gold (AuCl_3) and chloride of sodium (NaCl). Made by dissolving gold in nitrohydrochloric acid, evaporating to dryness, weighing, and dissolving in eight times its weight of distilled water. Pure decrepitated common salt, equal in weight to the dry chloride, is then added, previously dissolved in four parts of water. The mixture is then evaporated to dryness, with constant stirring.

TEST-SOLUTION OF PLATINIC CHLORIDE.—1 p. chloride; 20 p. distilled water.

PART IV.

THE PREPARATIONS OF THE ORGANIC MATERIA MEDICA.

What is Organic Chemistry? *The science of the carbon compounds.*

The following pages treat of both officinal and non-officinal organic substances, and the former may be distinguished from the latter by the letters U. S. following the officinal names.

THE CELLULIN GROUP.

CELLULIN. $C_6H_{10}O_5$.

What is cellulín, or cellulose? The woody fibre of plants, forming the skeleton for the vegetable tissues.

What is lignín? The substances which are found adhering to the cellulín skeleton of plants and vegetable tissues."

Describe pure cellulín. It is seen in the pure condition in raw cotton, the hairs of the seed of the cotton plant, and in many vegetable products. It is white, translucent, unalterable in the air; sp. gr., 1.5; insoluble in all the usual solvents, but soluble in ammoniacal solution of oxide of copper; converted into dextrín by treating with strong sulphuric or phosphoric acid, and, further, converted into glucose if the mixture be diluted with water and heated.

What is parchment-paper? Cellulín, in the form of unsized paper, after treatment with a mixture consisting of 2 p. H_2SO_4 sp. gr., 1.840, and 1 p. H_2O , by measure, cooled to $15^{\circ} C.$ ($59^{\circ} F.$), and washing in dilute $AmHO$.

For what is parchment-paper used in pharmacy? As a septum for dialysis.

What important principle in pharmacy is owing to the insolubility of cellulín in ordinary solvents? As cellulín forms the bulk of inert matter in plants, and is insoluble in ordinary solvents, active principles soluble in such solvents can be readily separated from it.

When used for the purpose of separating the active principles in plants from the inert cellulín, what are solvents called? Menstrua.

GOSSYPÍUM PURIFICATUM, U. S.—Purified Cotton. (*Gossypium. Pharm. 1880. Absorbent Cotton.*)—Cotton freed from the trace of fatty matters always existing in raw cotton, by boiling it in a weak alkaline solution, rinsing it in a weak solution of chlorinated lime, to whiten it, dipping it in a very dilute solution of HCl , washing with cold water, drying, and carding. The loss is about 10 per cent.

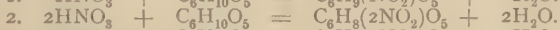
Products Resulting from the Decomposition of Cellulin.

CLASS I.—PRODUCTS MADE BY DECOMPOSING CELLULIN OR LIGNIN BY THE ACTION OF ACIDS OR ALKALIES.

PYROXYLINUM, U. S.—Pyroxylin. (*Pyroxylin. Pharm. 1870.*) *Soluble Gun-Cotton.*—A very inflammable, slightly explosive substance, resembling cotton, formed by acting on cotton 1 p. with nitric acid 10 p., and sulphuric acid 12 p., for ten hours, or until a portion taken out is found soluble in a mixture consisting of 1 p. alcohol, 3 p. str. ether (by volume), after which it is washed and dried.

What is Pyroxylinum chemically? Di nitro-cellulin. $C_6H_8(2NO_2)O_5$.

Explain its formation. It belongs to a series of nitro-compounds of cellulin, formed by the action of nitric acid on this substance, by which nitrogen dioxide is substituted for one, two, or three of its hydrogen atoms, as follows:—



1. Insoluble in mixture of ether and alcohol. Non-explosive.

2. Soluble “ “ “ “ “ Slightly explosive. Official.

3. “ “ “ “ “ Highly explosive (gun-cotton).

ACIDUM OXALICUM.—Oxalic Acid. $H_2C_2O_4 \cdot 2H_2O$; 126.—Small, colorless, prismatic crystals; odorless, and with a very sour taste. Made by acting on cellulin, sugar, or starch, with nitric acid; but prepared on a commercial scale by heating sawdust with a mixture of two molecules caustic soda and one molecule potassa. The gray mass resulting is washed with Na_2CO_3 , whereby the potash is removed as carbonate, and the less soluble sodium oxalate remains. This is converted into calcium oxalate by milk of lime, and then decomposed with H_2SO_4 , and purified by recrystallization.

Products Resulting from the Destructive Distillation of Cellulin and Lignin.

What occurs when wood is distilled in close vessels without air? Several solid, liquid, and gaseous products are formed, of which the principal ones are the following:—

SOLIDS.—Charcoal, inorganic salts, etc. **LIQUIDS.**—1. Aqueous liquid, containing *acetic, formic, butyric, crotonic, capronic, propionic acids, acetone, methylic alcohol, furfural, methylamine, pyrocatechin*, and small quantities of empyreumatic oils and resins. 2. Tarry liquid, containing *toluol, xytol, cumol, methol, mesitylene, pseudo cumol, phenol, cresol, guaiacol, creasol, phlorol*, and *methyl creasol, naphthalene, paraffin, pyrene, chrysene, retene, mesit.* **GASES.**—Carbon dioxide, carbon monoxide, marsh gas, *acetylene, ethylene, propene*, and others.

Which are the most important of these? Charcoal, tar, acetic acid, acetone, methylic alcohol, and creasote.

ACIDUM ACETICUM, U. S.—Acetic Acid. $HC_2H_3O_2$; 60.—A clear, colorless liquid, with a distinctly vinegar-like odor, and purely

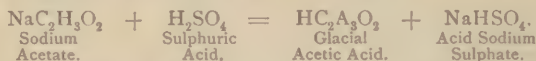
acid taste, composed of 36 per cent. absolute acetic acid and 64 per cent. water. Made by distilling oak wood at a temperature much less than that necessary to produce charcoal.

Acetic acid is also made by distilling *vinegar*, which, in turn, is made by oxidizing dilute alcoholic liquids. In Germany it is made by oxidizing alcohol, by pouring a very dilute alcoholic solution on beech wood shavings, which exposes a large surface to the air.

What two strengths of acetic acid are found in commerce? The official acid and No. 8 acid. The former has a specific gravity of 1.048, the latter 1.040, and is 20 per cent. weaker. It is called No. 8 acid because it was formerly used in the proportion of 1 to 8, to make dilute acetic acid or distilled vinegar.

ACIDUM ACETICUM DILUTUM, U. S.—Diluted Acetic Acid.—The liquid used as the menstruum for the official vinegars, containing 6 per cent. absolute $\text{HC}_2\text{H}_3\text{O}_2$; specific gravity, 1.0083. Made by diluting 17 p. acetic acid with 83 p. distilled water, to make 100 parts.

ACIDUM ACETICUM GLACIALE, U. S.—Glacial Acetic Acid. $\text{HC}_2\text{H}_3\text{O}_2$; 60.—At or below 15°C . (59°F .), a crystalline solid; at higher temperatures, a colorless liquid; sp. gr. 1.056 to 1.058, at 15°C . (59°F .). Made by heating sodium acetate until the water of crystallization has been driven off, powdering the residue, and distilling it with concentrated sulphuric acid. The reaction is as follows:—



PIX LIQUIDA, U. S.—Tar.—An empyreumatic oleoresin, obtained by the destructive distillation of the wood of *Pinus Palustris* and of other species of *Pinus*. It is usually obtained as a by-product in the manufacture of charcoal or acetic acid.

Official Description.—Thick, viscid, semi fluid, blackish-brown, heavier than water, transparent in thin layers, becoming granular or opaque by age; having an acid reaction, an empyreumatic terebinthinate odor, and a sharp, empyreumatic taste; slightly soluble in water, soluble in alcohol, in fixed or volatile oils, and in solution of potassa or of soda.

Syrupus Picis Liquidæ, U. S.—Syrup of Tar.

Unguentum Picis Liquidæ, U. S.—Tar Ointment.

OLEUM PICIS LIQUIDÆ, U. S.—Oil of Tar.—An almost colorless liquid, distilled from tar, soon acquiring a dark, reddish-brown color when exposed to the air; having a strong, tarry odor and taste and acid reaction; specific gravity about 0.970.

Black Pitch.—The residue left after the distillation of tar.

CREOSOTUM, U. S.—Creosote.—An almost colorless or yellowish, strongly refractive, oily liquid, turning to reddish-yellow or brown by exposure to light; penetrating, smoky odor; burning, caustic taste; neutral reaction; specific gravity 1.035 to 1.085.

Creosote is a production of the distillation of wood-tar, consisting mainly of the following phenols; *guaiacol*, or *oxyresol*, $\text{C}_7\text{H}_8\text{O}_2$, boiling at 200°C . (392°F .); *creosol*, $\text{C}_8\text{H}_{10}\text{O}_2$, boiling at 217°C . (422.6°F .);

methylcreosol, $C_9H_{12}O_2$, boiling at 214° C. (417° F.) to 218° C. (424.4° F.); *phlorol*, $C_8H_{10}O_2$, boiling at 219° C. (426.2° F.).

When wood tar is distilled, a solution of several layers is formed. The lower, oily layer is treated with K_2CO_3 , to neutralize the acid present. Fractional distillation, with alternate treatment of the distillate with H_2SO_4 and KHO , to separate impurities, and final distillation, yields the product called creosote, which comes over between 205° and 220° C. (401° and 428° F.).

Nearly all of the liquid sold for creosote in the market is impure carbolic acid or coal tar creosote. It is distinguished from true wood creosote in the following manner: Creosote does not coagulate albumen or collodion. (For other tests, see U. S. P.)

Aqua Creosoti, U. S.—Creosote Water.

NAPHTALINUM, U. S.—Naphthalin. $C_{10}H_8$ 127.7. (*Naphtalene*).—A hydrocarbon obtained from coal tar. Colorless, shining, transparent laminae, having a strong, characteristic odor resembling that of coal-tar, and a burning, aromatic taste; slowly volatilized on exposure to the air. Insoluble in water, but when boiled with the latter imparting to it a faint odor and taste. Soluble in 15 parts of alcohol at 15° C. (59° F.), and very soluble in boiling alcohol; also very soluble in ether, chloroform, carbon disulphide, and fixed or volatile oils.

NAPHTOL, U. S.—Naphtol. $C_{10}H_7OH$ 143.66. (*Beta-Naphtol*). A phenol occurring in coal-tar, but usually prepared artificially from naphthalin. Colorless, or pale buff-colored, shining, crystalline laminae, or a white, or yellowish white, crystalline powder, having a faint, phenol-like odor and a sharp and pungent, but not persistent, taste. Permanent in the air. Soluble at 15° C. (59° F.), in about 1000 parts of water, and in 0.75 part of alcohol; in about 75 parts of boiling water, and very soluble in boiling alcohol. Also very soluble in ether, chloroform, or solution of caustic alkalis.

Products Resulting from the Natural Decomposition of Cellulin and Lignin and their Derivatives.

Coal.—A fossil formation found in the earth, formed by the decomposition of cellulin, lignin, etc., under the changing influence of moisture, temperature, and pressure.

Coal Tar.—A residue left after the dry distillation of bituminous coal in the process of making illuminating gas. It consists of a large number of products in the forms of solids, liquids, and gases, a number of which form very valuable products in the arts.

OLEUM SUCCINI.—Oil of Amber.—Amber is a fossil residue of an extinct coniferous wood, found principally on the Baltic coast. Its volatile oil is obtained by the destructive distillation of amber, and purified by subsequent rectification.

Describe It.—It is a pale, yellow liquid, having an empyreumatic odor and a warm, acid taste; specific gravity, 0.920; soluble in alcohol, and converted into a brown, resinous mass, known as artificial musk, by fuming nitric acid.

ACIDUM CARBOLICUM CRUDUM, U. S.—Crude Carbohc Acid.—A liquid obtained during the distillation of coal tar, between the temperatures of 170° to 190° C. (338° and 374° F.), and containing carbohc and cresylic acids in variable proportions, together with other substances.

Official Description.—A nearly colorless or reddish-brown liquid, of a strongly empyreumatic and disagreeable odor, having a benumbing, blanching, and caustic effect on the skin or mucous membrane, and a neutral reaction.

ACIDUM CARBOLICUM, U. S.—Carbohc Acid. C_6H_5HO ; 94. (*Phenol*).—Colorless, interlaced, needle shaped crystals, sometimes acquiring a pinkish tint; deliquescent on exposure. It produces a benumbing, blanching, and caustic effect on the skin. It has a distinctive, slightly aromatic odor, resembling creosote; when diluted, a sweetish taste, with a slightly burning after taste; neutral reaction; and is a product of the distillation of coal tar between the temperatures of 180° and 190° C. (356° and 374° F.).

Unguentum Acidi Carbolici, U. S.—Ointment of Carbohc Acid.

ACETANILIDUM, U. S.—Acetanilid. $C_6H_5NH.C_2H_3O$ = 134.73. (*Phenyacetamide*).—An acetyl derivative of aniline, occurring in white, shining, micaceous, crystalline laminae, or a crystalline powder, odorless, having a faintly burning taste, and permanent in the air. Soluble at 15° C. (59° F.), in 194 parts of water, and in 5 parts of alcohol; in 18 parts of boiling water, and in 0.4 part of boiling alcohol; also soluble in 18 parts of ether, and easily soluble in chloroform, melting at 113° C. (235.4° F.), and consumed without residue when ignited.

RESORCINUM, U. S.—Resorcin. $C_6H_4(OH)_2$ = 109.74 (*Resorcinol*, *Metadioxyphenol*).—A diatomic phenol, colorless, or faintly reddish, needle-shaped crystals or rhombic plates, having a faint, peculiar odor, and a disagreeable, sweetish, and afterward pungent taste. Resorcin acquires a reddish or brownish tint by exposure to light and air. Soluble at 15° C. (59° F.), in 0.6 part of water, and in 0.5 part of alcohol; very soluble in boiling water or in boiling alcohol; also readily soluble in ether or glycerin; very slightly soluble in chloroform.

SALOL, U. S.—Salol. $C_6H_5C_7H_5O_3$ = 213.49. (*Phenyl Salicylate*).—The salicylic ether of phenol. A white, crystalline powder, odorless, or having a faintly aromatic odor, and almost tasteless. Permanent in the air. Almost insoluble in water; soluble in 10 parts of alcohol at 15° C. (59° F.); very soluble in boiling alcohol; also soluble in 0.3 part of ether, and readily in chloroform, and in fixed and volatile oils.

ZEA, U. S.—Zea. (*Corn Silk*).—The styles and stigmas of Zea Mays.

Extractum Zee Fluidum.—Fluid Extract of Corn Silk.

ACIDUM SALICYLICUM, U. S.—Salicylic Acid. $HC_7H_5O_3$; 138.—Fine, white, light, prismatic, needle shaped crystals, permanent in the air; free from odor of carbohc acid; having, sometimes, a slight aromatic odor; sweetish and slightly acid taste; acid reaction. Prepared by treating sodium phenol (or carbolate) with carbon dioxide. The sodium

phenol is prepared by evaporating to dryness equal amounts of concentrated caustic soda solution and phenol ; this is then heated to 100° C. (212° F.), while a stream of dry CO₂ is passed over it. The temperature is gradually raised as soon as the phenol distills over, until it reaches 250° C. (482° F.), until no more phenol distills. Half of the phenol used remains in the retort, as sodium salicylate, while the other half distills over unchanged. The reaction is as follows:—



The normal sodium salicylate thus obtained is then decomposed by HCl, and the salicylic acid is filtered out, washed and crystallized, or purified by sublimation and superheated steam or by dialysis.

AMYLACEOUS AND MUCILAGINOUS PRINCIPLES AND THEIR PRODUCTS.

AMYLUM, U. S.—Starch.—The fecula of the seed of *Triticum vulgare*, occurring in irregular, angular masses, which are easily reduced to powder ; of a white color ; under the microscope, appearing as granules, mostly very minute, more or less lenticular in form, and indistinctly, concentrically striated. Inodorous and tasteless.

Starch is present in many drugs and is an important constituent of many vegetable foods. It is usually made from potatoes by separating the cellular substance from the starch, by grating and pressing the soft mass upon a sieve, the starch granules falling through. It may be, also, prepared from wheat or corn, by allowing the grain to ferment, which disintegrates it, and stopping the fermentation before the starch is affected. The quality of starch depends largely upon the quality and purity of the water used in washing it.

Chemical Composition of Starch.—It has the same chemical composition as cellulose, C₆H₁₀O₅, and is closely allied to it and its properties.

Office of Starch in the Vegetable Kingdom.—It is stored up in plants as a food, in anticipation of future usefulness in the formation of plant tissues.

Description of the Starch Granule.—In young plants the starch granule is always spherical, but it subsequently becomes ovoid, lenticular, polyhedral or irregular in shape. Various plants exhibit characteristic starch granules peculiar to each, which may be identified by the microscope. The granule occurs in concentrically arranged layers of different densities, arranged around a central point, usually situated at one end of the granule, and called the *hilum*.

GLYCERITUM AMYLI, U. S.—Glycerite of Starch. (*Starch Jelly*.)—10 p. starch ; 90 p. glycerine.

MALTUM.—Malt.—The seed of *hordeum distichum*, caused to enter the incipient stage of germination by artificial means, and dried.

Barley is steeped in water until it swells and becomes tender. It is then spread thickly on a stone floor, where it heats spontaneously and germinates. The germination is now partially stopped by spreading it more thinly. It is then raked into heaps and allowed to stand for a day, when it becomes hot. Afterward, it is dried in a kiln.

Object of " Malting " Grain.—During the process of germination, the starch of the grain is converted into *maltose* (a peculiar kind of sugar) and *dextrin*, owing to the presence of *diastase*, a peculiar and powerful ferment developed during the process. The starch remaining after this fermentation is further converted into maltose during the heating in the kiln.

Diastase.—Malt usually contains about two parts in a thousand of diastase, which may be prepared from it by bruising fresh malt, adding about half its weight of water, expressing strongly, treating the viscid liquid thus obtained with sufficient alcohol to destroy its viscosity, then separating the coagulated albumen, and adding a fresh portion of alcohol, which precipitates the diastase in an impure state. To render it pure, it must be redissolved as often as three times in water, and precipitated by alcohol.

Property of Diastase.—It has the property of converting starch into dextrin and maltose. Only about one part in two thousand of starch, suspended in water, is required. The mixture should be maintained at a temperature of about 71.1°C. (160°F.).

Malt is used in Medicine in the forms of extract of malt, malt foods, etc. It is useful, first, as a food; second, as a digestive, owing to the diastase it contains and its peculiar property.

EXTRACTUM MALTI, U. S.—Extract of Malt.—Occurring in the form of a thick, honey like extract. Made by macerating and digesting 100 p. malt with cold water, and then with water at a temperature of 55°C. (131°F.), straining and evaporating *in vacuo*.

CETRARIA, U. S.—Cetraria. (*Iceland Moss.*)—A lichen found in northern latitudes, on both continents, named *cetraria islandica*, containing 70 per cent. *lichenin*, $\text{C}_{12}\text{H}_{20}\text{O}_{10}$ (strongly allied to starch, which swells up in water); about 3 per cent. *cetraric acid*, $\text{C}_{18}\text{H}_{16}\text{O}_8$ (crystalline and very bitter); *lichenstearic acid*, $\text{C}_{11}\text{H}_{34}\text{O}_3$; sugar, oxalic acid, fumaric acid, and celluline.

DECOCTUM CETRARIÆ, U. S.—Decoction of Cetraria.—(See Decocta, Part II.)

In the official process for this preparation, the cetraria is first macerated with water, and expressed before it is finally boiled with water, to separate the bitter principle, cetraric acid.

CHONDRUS, U. S.—Chondrus. (*Irish Moss.*)—An alga growing in the Atlantic Ocean, named *Chondrus crispus*, containing 70 per cent. *carrageenin*, a mucilaginous principle, differing from gum by not precipitating with alcohol; from starch, by not becoming blue with iodine; and from pectin, by not precipitating with subacetate of lead.

GUMS AND MUCILAGINOUS SUBSTANCES.

GUM, now known by the name, *arabin*, is a vegetable substance, forming a thick, glutinous liquid with water; insoluble in alcohol, and converted into mucic and oxalic acid with nitric acid.

Three Proximate Principles found in Gums.—Arabin, or arabic acid, $\text{C}_{17}\text{H}_{22}\text{O}_{11}$ (soluble), found in acacia; bassorin, $\text{C}_{12}\text{H}_{20}\text{O}_{10}$ (insoluble), found in tragacanth; cerasin (insoluble), found in cherry gum.

Gums differ from starch or cellulin by being soluble in water or by swelling up in contact with it.

They differ from sugar by being incapable of vinous fermentation with yeast.

ACACIA, U. S.—Acacia. (*Gum Arabic*)—A gummy exudation from *Acacia Verek* and from other species of *Acacia*, consisting, mainly, of calcium, potassium, or magnesium arabate; occurring in roundish or amorphous pieces, or irregular fragments of various sizes, more or less transparent, hard, brittle, pulverizable, and breaking with a shining fracture. It is usually white or yellowish-white, but frequently presents different shades of red, and is sometimes of a deep orange or brownish color. It is bleached by exposure to the sun. In powder it is always white. It is inodorous, has a feeble, slightly sweetish taste, and, when pure, dissolves in the mouth; specific gravity, 1.31 to 1.525. At ordinary temperatures, it forms a thick, glutinous liquid, of distinctly acid reaction when dissolved in water. It does not precipitate with neutral lead acetate, but the basic acid forms a precipitate, even with dilute solution. Solutions of ferric salts, silicates and borates render gum solution turbid or thicken it to jelly. Iodine, silver, and mercuric chloride produce no alteration. Ammoniacal solution of cupric oxide dissolves it.

MUCILAGO ACACIÆ, U. S.—Mucilage of Acacia. (See Mucilagines, Part II.)

SYRUPUS ACACIÆ, U. S.—Syrup of Acacia. (See Syrupi, Part II.)

TRAGACANTHA, U. S.—Tragacanth.—A gummy exudation from *Astragalus gummifer* and from other species of *Astragalus*, consisting of 33 per cent. of bassorin, 53 per cent. soluble gum (not arabin), 11 per cent. water, 3 per cent. impurities; occurring either in flaky, leaf-like pieces or in tortuous, vermicular filaments, of a whitish color, somewhat translucent and resembling horn in appearance; hard, and more or less fragile, but difficult of pulverization unless exposed to a freezing temperature or thoroughly dried and powdered in a heated mortar; odorless; very little taste; sp. gr. 1.384; introduced into water, it absorbs a certain proportion, swells very much, and forms a soft, adhesive paste, but does not dissolve; agitated with an additional quantity of water, this paste forms a uniform mixture; but in the course of one or two days, the greater part separates, and is deposited, leaving a portion dissolved in the supernatant fluid; the gelatinous mass is turned blue by iodine, and the fluid portion is not precipitated by alcohol; wholly insoluble in alcohol. Tragacanth appears to be composed of two different constituents, one resembling acacia, soluble in water; the other insoluble, but swelling in water. The former differs from acacia in affording no precipitate with potassium silicate or ferric chloride.

MUCILAGO TRAGACANTHÆ, U. S.—Mucilage of Tragacanth. (See Mucilagines, Part II.)

ULMUS, U. S.—Elm. (*Slippery Elm*).—The inner bark of *Ulmus fulva*, containing a mucilage precipitated by alcohol and lead acetate.

Mucilago Ulma, U. S.—Mucilage of Elm.

SASSAFRAS MEDULLA, U. S.—Sassafras Pith.—The pith of

Sassafras officinalis, containing a delicate mucilage, which is not precipitated by alcohol.

Mucilago Sassafras Medulle, U. S.—Mucilage of Sassafras Pith.

CYDONIUM.—Cydonium. (*Quince Seed*.)—The seed of *Cydonia vulgaris*, containing about 20 per cent. of a peculiar mucilage, not precipitated by borax.

ALTHÆA, U. S.—Althæa. (*Marshmallow*.)—The root of *Althæa officinalis*, containing a large quantity of mucilage, $C_{12}H_{20}O_{10}$, associated with *asparagin*, sugar, and starch.

Syrupus Althææ, U. S.—Syrup of Althæa.

LINUM, U. S.—Linseed.—The seed of *Linum usitatissimum*, containing 15 per cent. mucilage, $C_{12}H_{20}O_{10}$, in the epithelium, and 20 to 35 per cent. fixed oil in the nucleus, besides resin, sugar, wax, etc. The mucilage is soluble in water, readily soluble in hot water, forming a thick, viscid liquid, precipitated by alcohol and subacetate of lead.

SUGARS AND SACCHARINE SUBSTANCES.

Sugars are organic bodies, having a sweet taste, generally of vegetable origin and crystallizable; of a neutral reaction; soluble in water, their solutions being optically active to polarized light.

Two Classes of Sugar.—Fermentable and non-fermentable sugars.

1. FERMENTABLE SUGARS are the more important, being largely consumed in food products. The fermentable sugars are divided into two sub-classes—*glucoses*, or sugars *directly* subject to vinous fermentations, and *saccharoses*, or sugars *indirectly* subject to vinous fermentation.

GLUCOSES. $C_6H_{12}O_6$.—The formula for the *glucoses* is $C_6H_{12}O_6$. The principal ones are—*glucose* (dextro-glucose or dextrose), which rotates the plane of polarization strongly to the right; obtained by treating starch with H_2SO_4 and lime, separating the $CaSO_4$, and evaporating the solution. *Grape sugar* (crystallized glucose); obtained by crystallizing the above solution. *Lævulose* (lævo-glucose) rotates the plane of polarization strongly to the left; found in sugar cane. *Maltose*, $C_{12}H_{22}O_{11} + H_2O$; obtained by action of diastase on starch, etc.

GLUCOSE. $C_6H_{12}O_6$, is prepared by the action of dilute H_2SO_4 upon starch. It may also be obtained from candied sugar, grapes, and other sources. Glucose is the term applied to the syrupy preparation, grape sugar to the solid product. The process is as follows: Corn is first soaked in warm water, then ground with a stream of water, the starch washed from the meal in a trough with bolting cloth bottom, beaten with caustic soda, to separate the gluten, washed and treated with dilute H_2SO_4 and steam. This process is called "open conversion," and takes about two hours. Or the substances are acted upon with superheated steam, in a closed cylinder. This is called "close conversion," and takes about fifteen minutes. After conversion, the substances are treated with marble dust and animal charcoal, filtered, and evaporated in *vacuo*.

Glucose can be obtained as a hydrate, in small and laminated crystals, from aqueous solutions, and anhydrous in hard, crystalline masses, either from alcoholic solution or from very concentrated aqueous solution.

Properties.—Less sweet than cane sugar; less soluble in water, more soluble in alcohol; sp. gr. 1.54–1.57, when anhydrous. Strong mineral acids act sparingly on it, but with facility on cane sugar. Alkalies readily destroy it, but form definite compounds with cane sugar. Boiled with water, it suffers very little alteration; rotates polarized light to the right; undergoes vinous fermentation directly; reduces alkaline tartrate of copper, producing a reddish precipitate.

SACCHAROSE, $C_{12}H_{22}O_{11}$. The peculiar characteristic of sugars of this class is, that they are fermentable only after being converted into glucoses.

Principal Saccharoses.—Cane sugar (saccharose), from sugar cane, beets, etc.; para-saccharose, by fermenting spontaneously cane sugar; milk sugar (lactose, lactic), from milk.

2. NON-FERMENTABLE SUGARS. (Sometimes called saccharoids.)

Principal non-fermentable sugars. Mannit, $C_6H_{14}O_6$; dulcitol, $C_6H_{14}O_6$; eucalyn; inositol, etc., etc.

SACCHARUM, U. S.—Sugar.— $C_{12}H_{22}O_{11}$; 342.—The refined sugar of *Saccharum officinarum*, made, commercially, from sugar cane, beet root, and sorghum; occurring in white, dry, hard, distinctly crystalline granules, permanent in the air; odorless; purely sweet taste; neutral reaction. Prepared by crushing and expressing sugar cane, adding calcium bisulphite and a little lime, heating, straining, evaporating, cooling, and stirring, transferring to casks, perforated at the bottom, and the crystals drained. This is known as the open-pan process. The vacuum-pan process, which now almost completely displaces it, consists in removing the lime by CO_2 , filtering through bone-black, concentrating in a vacuum-pan, crystallizing, and drying the crystals in “centrifugals” by rapid revolutions.

The best sugar for pharmaceutical uses is granulated sugar, as it is not liable to absorb moisture, like loaf sugar, and does not lose weight when kept in dry air.

Rock Candy.—Crystallized sugar. Sp. gr. 1.606.

MEL, U. S.—Honey.—A saccharine secretion deposited in the honey-comb by *Apis mellifica*, and occurring as a syrupy liquid, of a light yellowish or pale, brownish-yellow color, translucent, gradually becoming crystalline and opaque; characteristic odor; sweet, faintly acid taste.

MANNA, U. S.—Manna.—A concrete, saccharine exudation of *Fraxinus ornus*, usually occurring of a yellowish-white color externally; internally white, porous, and crystalline; sp. gr. 0.834. When pure, it is soluble in three parts of cold water and its own weight of boiling water. It separates, in crystalline masses, from a boiling saturated aqueous solution; soluble in alcohol, and depositing, from a boiling alcoholic solution, beautiful crystals of a peculiar, sweet principle, found in manna and many other plants, called *mannit*.

GLYCYRRHIZA, U. S.—Glycyrrhiza. (*Licorice Root*).—The root of *glycyrrhiza glabra*, containing the sweet principle *glycyrrhizin*, or *glycyrrhizic acid*, $C_{41}H_{63}NO_{13}$, existing in the root, in combination with ammonium.

Extractum Glycyrrhizæ, U. S.—Extract of Glycyrrhiza.

Extractum Glycyrrhizæ Purum, U. S.—Pure extract of Glycyrrhiza.

Pulvis Glycyrrhizæ Compositus, U. S.—Compound Powder of Glycyrrhiza.

Extractum Glycyrrhizæ Fluidum, U. S.—Fluid Extract of Glycyrrhiza.

GLYCYRRHIZINUM AMMONIATUM, U. S.—Ammoniated Glycyrrhiza.—Made by percolating licorice root with water, adding H_2SO_4 as long as a precipitate is produced, and redissolving the precipitate in water, with the aid of AmHO , and scaling. Yield, about 10 per cent.

TRITICUM, U. S.—Triticum. (*Couch Grass*).—The rhizome of *Triticum repens*, gathered in the spring, and deprived of the rootlets, containing *tritacin*, a principle resembling inulin, also glucose, levulose, etc.

Extractum Tritici Fluidum, U. S.—Extract of Triticum.

Derivatives of Sugar through the Action of Ferments.

Fermentation.—Decomposition occurring in organic bodies on exposure to the action of moisture, air, and a warm temperature, resulting in the formation of new products. When the products are worthless or offensive, the process is called *putrefaction*; when useful, it is called *fermentation*.

Cause of Fermentation.—The present theory is, that fermentation is caused by the presence of certain micro-organisms, called *bacteria*.

Two Classes into which Ferments are Divided.—Ferments are divided into two classes—organized, or physiological ferments, as yeast, mycoderms, torulas, etc., and unorganized, or chemical ferments, like diastase, synaptase, myrosin, etc.

Vinous Fermentation.—The decomposition of cane sugar into alcohol and carbon dioxide, which occurs when sugar is exposed to the action of water, air, and a warm temperature, and seems to be caused by a microscopic plant, which has been named *Torula cerevisiæ*.

Result of the Action of Dilute Acids and Ferments on Cellulin and Starch.—They are converted into alcohol or acetic acid.



then,



then,



If the process is not stopped here, the alcohol is oxidized into acetic acid:—



The most important derivative of sugar through the action of a ferment is *alcohol*, usually obtained from whiskey by distillation.

The distilled products of vinous liquors forming the different ardent spirits of commerce are: *brandy*, from wine; *rum*, from fermented molasses; *whiskey*, from cider, malted barley or rye; *Holland gin*, from malted barley and rye meal, with hops, and rectified from juniper berries; *common gin*, from malted barley, rye, or potatoes, and rectified from turpentine; *arrack*, from fermented rice.

The compounds derived from sugars may be considered under three heads: 1st. Ethyl hydrate and oxide, and their preparations; 2d. Preparations of the compound ethers of the ethyl and amyl series; 3d. Aldehyd, its derivatives and preparations.

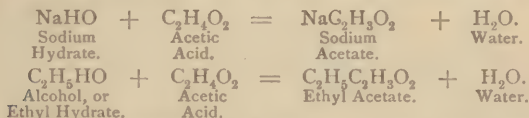
Ethyl Hydrate and Oxide, and their Preparations.

Alcohol is a term used to designate a class of carbon compounds called *alcohols*. Alcohols are hydrates of the radicals *ethyl*, *amyl*, etc., just as calcium hydrate is the hydrate of the metal calcium.

Ethers are the oxides of the radicals, just as the calcium oxide is the oxide of the metal calcium.

Compound ethers are analogous to the salts of metals, just as potassium nitrate, sodium acetate, etc., are compounds of the metals potassium and sodium with the acidulous radicals characterizing nitrates and acetates. They are formed by the decomposition of their alcohols (hydrates) by acids, just as calcium sulphate may be produced by decomposing hydrate of calcium. Water is formed as one of the results of the decomposition.

The following reactions will illustrate the formation of compound ethers:—



SPIRITUS FRUMENTI, U. S.—Whiskey.—An alcoholic liquid, obtained by the distillation of fermented grain (usually corn, wheat, or rye), and at least two years old. It has an amber color, a distinctive taste and odor, and a sp. gr. not above 0.930 nor below 0.917, corresponding, approximately, with an alcoholic strength of 44 to 50 per cent., by weight, or 60 to 58 per cent. by volume.

Preparation.—From grain—first, *mashing*, by which the starch is converted into sugar; second, *fermentation*, by which the sugar is converted into alcohol; third, *distillation*, by which the alcohol is separated as crude spirits.

ALCOHOL, U. S.—A liquid composed of 91 per cent. by weight (94 per cent. by volume) of ethyl alcohol ($\text{C}_2\text{H}_5\text{HO}$; 46) and 9 per cent. by weight (6 per cent. by volume) of water. Sp. gr. 0.820 at 15.6° C. (60° F.), and 0.812 at 25° C. (97° F.); occurring as a transparent, colorless, mobile, and volatile liquid, of a characteristic, pungent, and agreeable odor and a burning taste. Boiling at 78° C., and usually obtained by distilling *whiskey*, redistilling, and rectifying.

Impurities.—Whiskey is liable to contain *fusel oil*, or *amyl alcohol*,

giving it a characteristic odor. It may be deprived of odor by treating it with potassium permanganate, and redistilling.

Absolute Alcohol.—Alcohol entirely free from water. It is prepared by separating the 11 per cent. of water from the strongest alcohol that can be made by distillation, by the use of recently burned lime, out of contact with the air, and redistilling in *vacuo*. Its freedom from water may be tested with anhydrous baryta, or by its forming a clear solution when mixed with an equal bulk of pure benzol.

ALCOHOL DILUTUM, U. S.—Diluted Alcohol.—A liquid composed of 45.5 per cent. by weight (53 per cent. by volume) of ethyl alcohol of 54.5 per cent. by weight (47 per cent. by volume) of water; sp. gr. 0.928 at 15.6° C. (60° F.), and 0.920, at 25° C. (77° F.). Alcohol, 50 p., or 17 fluid ounces; distilled water, 50 p., or 14 fluid ounces.

Rule for Preparing Diluted Alcohol from Alcohol of any Higher Percentage.—"Divide the alcoholic percentage of the alcohol to be diluted by 45.5 and subtract 1 from the quotient. This gives the number of parts of water to be added to 1 part of the alcohol." All terms denote weight in this rule.

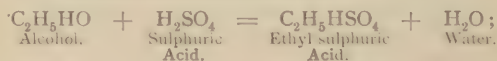
Result if Alcohol and Water are mixed together.—A contraction of volume takes place. (55 gallons of alcohol + 45 gallons of water equals 96¼ gallons—a loss of 3¾ gallons.)

Difference between United States Proof Spirits and Diluted Alcohol.—U. S. *proof spirit* contains 50 per cent. by volume of absolute alcohol, and has sp. gr. of 0.934; diluted alcohol contains 53 per cent. by volume of absolute alcohol, and has a specific gravity of 0.928.

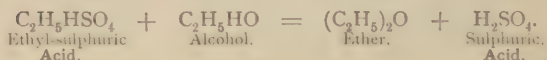
ALCOHOL ABSOLUTUM, U. S.—Absolute Alcohol. $C_2H_5OH = 45.9$.—Ethyl alcohol, containing not more than 1 per cent. by weight of water. Absolute alcohol should be kept in well stoppered bottles, or tin cans, in a cool place, remote from lights or fire. A transparent, colorless, mobile, and volatile liquid, of a characteristic, rather agreeable odor, and a burning taste; very hygroscopic. Sp. gr. not higher than 0.797 at 15° C. (59° F.); or 0.789 at 25° C. (77° F.).

ALCOHOL DEODORATUM, U. S.—Deodorized Alcohol.—A liquid composed of about 92.5 per cent. by weight, or 95.1 per cent. by volume of ethyl alcohol [$C_2H_5OH = 45.9$], and about 7.5 per cent. by weight, of water. Sp. gr. about 0.816 at 15° C. (59° F.); or 0.808 at 25° C. (77° F.).

ÆTHER.—Ether.—A liquid composed of about 74 per cent. of ethyl oxide ($C_2H_5)_2O$; 74, and about 26 per cent. of alcohol containing a little water; sp. gr. about 0.750 at 15° C. (59° F.). Made by acting on alcohol with H_2SO_4 , between the temperatures of 130° and 137.7° C. (260° and 280° F.). The following reactions occur:—



then,



It will be seen that the sulphuric acid is not consumed in the process, but is regenerated, so that theoretically the making of ether is continuous.

ÆTHER FORTIOR, U. S.—Stronger Ether.—A thin, very diffusive, clear, and colorless liquid, composed of about 94 per cent. of ethyl oxide ($C_2H_5)_2O$; 74. and about 6 per cent. of alcohol containing a little water; sp. gr. not higher than 0.725 at $15^\circ C.$ ($59^\circ F.$), or 0.716 at $25^\circ C.$ ($77^\circ F.$). Made in the same way as ordinary ether, and differing from it only in greater strength and purity.

SPIRITUS ÆTHERIS, U. S.—Spirit of Ether.—Ether 30 p.; Alcohol 70 p.

SPIRITUS ÆTHERIS COMPOSITUS, U. S.—Compound Spirit of Ether. (*Hoffman's Anodyne*).—Str. Ether 30 p.; Alcohol 67 p.; ethereal oil 3 p.

Substitute usually sold for Hoffmann's Anodyne.—After the rectification of crude ether, an additional distillate is obtained, consisting of ether and alcohol, impregnated with a little ethereal oil. This is “doctored” to conform to the taste, smell, etc., of Hoffmann's Anodyne, and may be detected by mixing it with water, with which it forms a clear solution, instead of the milky solution characterizing the genuine article. *Castor oil* is sometimes added to circumvent this test, which may be detected by mixing equal parts with water, and collecting the separated oil on filtering paper; castor oil leaves a permanent, greasy stain, distinguishing it from ethereal oil.

Preparations of the Compound Ethers of the Ethyl and Amyl Series.

OLEUM ÆTHEREUM, U. S.—Ethereal Oil.—A volatile liquid, consisting of equal volumes of Heavy Oil of Wine and Stronger Ether, occurring as a transparent, nearly colorless, volatile liquid; of a peculiar, aromatic odor; a pungent, refreshing, bitterish taste; and a neutral reaction to dry litmus paper; sp. gr. 0.910. Made by distilling alcohol and sulphuric acid together, at a temperature between 150° and $157^\circ C.$ (302° and $314.6^\circ F.$), until the liquid ceases to come over, or until a black froth begins to rise in the retort; separating the yellow ethereal liquid and exposing it to the air for 24 hours, in a shallow capsule, transferring it to a wet filter, and washing with distilled water and draining, then adding an equal volume of stronger ether.

When alcohol is distilled with a large excess of sulphuric acid, there are produced heavy oil of wine, sulphurous acid, olefiant gas, and empyreumatic products. This occurs toward the close of the distillation, and the products generally separate into two layers, one consisting of water holding sulphurous acid in solution, and the other, of ether containing the heavy oil of wine. The heavy oil of wine is obtained by separating it from the other products, exposing for twenty-four hours, to dispel the ether, and washing with water, to free it from all traces of sulphurous acid.

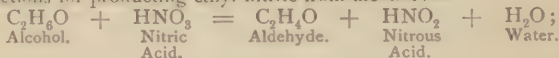
The above refers to the products formed in the latter stages of distillation. In the earlier stage, ethyl sulphuric acid, $C_2H_5HSO_4$, is formed, which, during the process, is decomposed, so as to yield ether. But if there is a large excess of sulphuric acid present, the ethyl sulphuric acid is decomposed, so as to form a small quantity of heavy oil of wine.

Ethereal oil is a mixture of compound ethers—ethyl sulphate ($C_2H_5)_2SO_4$, ethyl sulphite ($C_2H_5)_2SO_3$, with polymeric forms of ethylene, C_2H_4 .

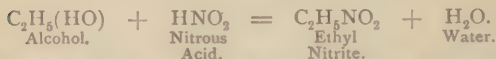
SPIRITUS ÆTHERIS NITROSI, U. S.—Spirit of Nitrous Ether. (*Sweet Spirit of Nitre.*)—A clear, mobile, volatile, and inflammable liquid, of a pale straw color, inclining slightly to green, and consisting of an alcoholic solution of ethyl nitrite ($C_2H_5NO_2$); 75; containing 5 per cent. of the crude ether; fragrant, ethereal odor; free from pungency; sharp, burning taste; sp. gr. 0.823 to 0.825. Prepared by distilling a mixture of alcohol, sulphuric acid, and nitric acid together, using a well-cooled condenser, and a receiver surrounded by ice, connected air tight, and further connected with a small vial containing water, into which the connecting tube dips, the temperature being maintained during the distillation not lower than $80^\circ C.$ ($176^\circ F.$) or higher than $82^\circ C.$ ($180^\circ F.$), until the reaction ceases. The distillation is then shaken in a flask with ice-cold distilled water, the ethereal layer separated and mixed with nineteen times its weight of alcohol.

In this process, ethyl nitrite is formed, and a compound ether is produced by substituting the acid radicle NO_2 for the hydrogen of the hydroxyl in the alcohol. This is then preserved from decomposition by adding sufficient alcohol.

Reactions for producing ethyl nitrite from alcohol:—



then,



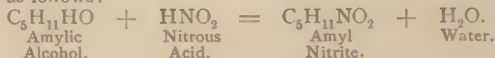
Pure Ethyl Nitrite is pale yellow; has the smell of apples; boils at $18^\circ C.$ ($64.4^\circ F.$); sp. gr. 0.900.

Sweet spirit of nitre is never entirely free from aldehyd; it is apt to contain a large amount of it if carelessly prepared. Aldehyd readily oxidizes to acetic acid, rendering the preparation sour.

ÆTHER ACETICUS, U. S.—Acetic Ether. $C_2H_5C_2H_3O_2$; 88. (*Acetate of Ethyl.*)—A transparent and colorless liquid, with a strong, fragrant, ethereal, and somewhat acetous odor; refreshing taste and neutral reaction. Prepared by distilling sodium acetate, alcohol, and sulphuric acid together, shaking the distillate with exsiccated sodium acetate, and re-distilling it. It is a solution of ethyl acetate and a mixture of alcohol and water.



AMYL NITRIS, U. S.—Amyl Nitrite. $C_5H_{11}NO_2$; 117.—A clear, pale-yellowish liquid; ethereal, fruity odor; aromatic taste; neutral or slightly acid reaction. Prepared by acting on amylic alcohol with nitric acid, by which the latter is deoxidized into nitrous acid, which acts on amylic alcohol as follows:—

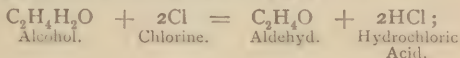


Aldehyd, its Derivatives and Preparations.

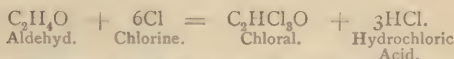
Aldehyd is a general term used to define a class of organic bodies. It has a more limited signification, however, as ordinarily used, and applies to ethyl aldehyd, which has a composition C_2H_4O , and is made by depriving alcohol, C_2H_6O , of two hydrogen atoms. This is effected by acting on alcohol with oxidizing agents.

PARALDEHYDUM, U. S.—Paraldehyde. $C_6H_{12}O_3 = 131.7$. A polymeric form of Ethylic Aldehyde ($C_2H_4O = 43.9$). A colorless, transparent liquid, having a strong, characteristic, but not unpleasant or pungent odor, and a burning and cooling taste. Soluble in 8.5 parts of water at $15^\circ C.$ ($59^\circ F.$), and in 16.5 parts of boiling water; miscible in all proportions with alcohol, ether, and fixed or volatile oils.

CHLORAL, U. S.—Chloral. $C_2HCl_3O = H_2O$; 164.97. (*Hydrate of Chloral*.)—Chloral is aldehyd in which three atoms of hydrogen have been replaced by three atoms of chlorine. It occurs in separate, rhomboidal, colorless, and transparent crystals, slowly evaporating on exposure to air; aromatic, penetrating, and slightly acrid odor; a bitterish, caustic taste; neutral reaction. Prepared by passing dry chlorine gas, in a continuous stream, through absolute alcohol for six or eight weeks.



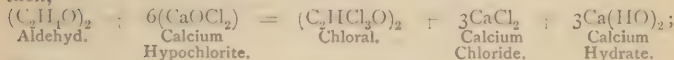
then,



CHLOROFORMUM VENALE.—Commercial Chloroform.—A liquid containing at least 98 per cent. of chloroform, obtained by distilling chlorinated lime with alcohol.



then,

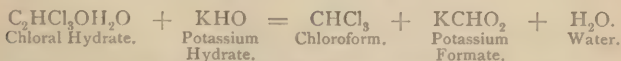


then,



Chloroform can also be produced by substituting three atoms of chlorine for three hydrogen atoms of *methane*, marsh gas, CH_4 . It is, therefore, chemically termed *trichlormethane*.

Chloroform can also be produced by acting on chloral hydrate with an alkali.



CHLOROFORMUM, U. S.—Chloroform. $CHCl_3 = 119.08$.

(*Chloroformum Purificatum*, *Pharm.* 1880.)—A heavy, clear, colorless, mobile, and diffusible liquid, of a characteristic, ethereal odor, and a burning, sweet taste; sp. gr. not below 1.490 at 15° C. (59° F.), or 1.473 at 25° C. (77° F.); boiling at 60° to 61° C. (140° to 141.8° F.); consisting of 99 to 99.4 per cent. by weight of absolute chloroform, and 1 to 0.6 per cent. of alcohol; neutral reaction. Prepared by purifying commercial chloroform with sulphuric acid, carbonate of sodium, alcohol and lime, and distilling.

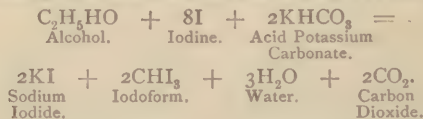
Rationale of the Operation.—Commercial chloroform contains as an impurity, a chlorinated pyrogenous oil, which is decomposed by the H_2SO_4 , and, in turn, blackened by it; the chloroform is separated from the H_2SO_4 , agitated with solution of Na_2CO_3 , to neutralize adhering acid, then mixed with alcohol, to preserve it from decomposition, and redistilled from lime, to separate water.

Spiritus Chloroformi, *U. S.*—Spirit of Chloroform.

Mistura Chloroformi, *U. S.*—Chloroform Mixture.

Linimentum Chloroformi, *U. S.*—Chloroform Liniment.

IODOFORMUM, U. S.—Iodoform. CHI_3 ; 392.8.—Small, lemon-yellow, lustrous crystals, of the hexagonal system; saffron-like and almost insuppressible odor; unpleasant, slightly sweetish, iodine-like taste; neutral reaction in solution. Made by heating alcohol, acid potassium carbonate, and iodine together, with water, and passing chlorine gas through the mixture, to cause the separation of iodoform, which may be filtered out, and purified by washing with distilled water and drying. (Fihol's Process.)



Products of the Action of Ferments upon Acid Saccharine Fruits.

Important alcoholic liquids, which have received various names, according to the fruits from which they are derived, are formed by the action of ferment upon acid saccharine fruits.

Wine, from grapes; cider, from apples; perry, from pears, etc., occur by fermenting these fruits.

VINUM ALBUM, U. S.—White Wine.—A pale, amber-colored, or straw-colored, alcoholic liquid. Made by fermenting the unmodified juice of the grape, freed from seeds, stems, and skin, and of a sp. gr. of not less than 0.990 nor more than 1.010; of a pleasant odor, free from yeastiness; a full, fruity, and agreeable taste; without excessive acidity or sweetness.

White wine should contain not less than 10 per cent. nor more than 12 per cent. by weight of absolute alcohol.

VINUM RUBRUM, U. S.—Red Wine.—A deep red, alcoholic liquid, made by fermenting the juice of colored grapes in the presence of their skins; of a sp. gr. not less than 0.989 nor more than 1.010; with a

pleasant odor, free from yeastiness; a full, fruity, moderately astringent, pleasant taste; without excessive acidity or decided sweetness.

The plant furnishing the grape is called *Vitis vinifera*. The juice of the fruit contains grape sugar, tannin, acid potassium tartrate, calcium tartrate, potassium sulphate, sodium chloride, pectin, albuminous principles, and water.

The aroma of wines depends upon the formation of certain compound ethers during the fermentation, and also during the ageing or ripening process.

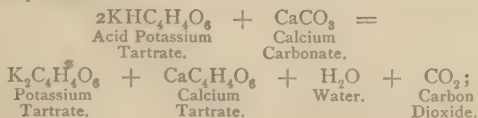
Difference between Sweet and Dry Wine.—When the quantity of sugar in the juice is large, and the amount of ferment insufficient to convert it all into alcohol, *sweet* wine is produced. When the quantity of ferment is sufficient to convert all the sugar into alcohol, a strong, or generous, wine is formed. If only a moderate amount of sugar is present, with enough ferment to convert it all into alcohol, the wine is termed dry.

Sparkling Nature and Roughness.—Wine containing carbonic acid gas is called *sparkling*; when the gas is absent it is called *still*. When fermented with the seeds, it becomes rough or astringent, owing to the presence of tannic acid in the seeds.

ARGOLS.—A precipitate of acid potassium tartrate, rendered impure by calcium tartrate, more or less coloring matter, and other matters deposited from the juice of the grape during fermentation and clarification. The precipitation is due to the fact that these matters, though soluble in grape juice, are insoluble in the dilute solution of alcohol formed by the fermentation.

SPIRITUS VINI GALLICI, U. S.—Brandy.—An alcoholic liquid obtained by the distillation of fermented grapes, and at least four years old. It should have a pale, amber color, a distinctive taste and odor, and sp. gr. not above 0.941 nor below 0.925, corresponding, approximately, with an alcoholic strength of 39 to 47 per cent. by weight, or 46 to 55 per cent. by volume.

ACIDUM TARTRICUM, U. S.—Tartaric Acid. $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$; 150.—Nearly or entirely colorless, transparent, monoclinic prisms, permanent in the air; odorless; purely acid taste; acid reaction. Prepared by saturating the excess of acid in acid potassium tartrate or cream of tartar (prepared from *argols*) with calcium carbonate, and decomposing the resulting insoluble calcium tartrate by sulphuric acid, which precipitates it in combination with the lime, as calcium sulphate, and liberates the tartaric acid. Only one-half the tartaric acid is thus obtained. The remainder may be procured by decomposing the neutral potassium tartrate remaining in the solution after the precipitation of the calcium tartrate, by calcium chloride in excess. This may be decomposed by sulphuric acid, together with the first portion.



then,



and



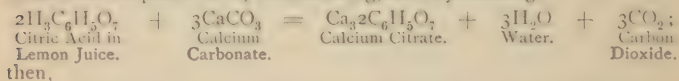
Pulvis Effervesens Compositus, U. S.—Compound Effervescent Powder (Seidlitz Powder).

LIMONIS SUCCUS, U. S.—Lemon Juice.—A yellowish, slightly turbid, acid liquid, having a slight odor of lemon, due to the presence of a trace of the volatile oil of the rind, containing about 7 per cent. of citric acid, and consisting of the freshly pressed juice of the ripe fruit of *Citrus limonum*.

Syrupus Limonis, U. S.—Syrup of Lemon.

Mistura Potassii Citratis, U. S.—Mixture of Citrate of Potassium.

ACIDUM CITRICUM, U. S.—Citric Acid. $\text{H}_3\text{C}_6\text{H}_5\text{O}_7, \text{H}_2\text{O}$; 210.—Colorless, right rhombic prisms, not deliquescent except in moist air; efflorescent in warm air; odorless; agreeable, acid taste; acid reaction. Obtained from the juice of limes and lemons, by saturating the boiling juice with calcium carbonate, and decomposing the resulting calcium citrate with sulphuric acid, concentrating, and crystallizing.



then,



Syrupus Acidi Citrici, U. S.—Syrup of Citric Acid.

TAMARINDUS, U. S.—Tamarind.—The preserved pulp of the fruit of *Tamarindus indica*, containing citric and tartaric acids and small quantities of malic acid. Used in preparing confection of senna.

RHUS GLABRA, U. S.—Rhus Glabra. (*Rhus Glabrum*. Pharm. 1870. *Sumach*.)—The fruit of *Rhus glabra*, containing malic acid, which exists in it as calcium and potassium malate.

Extractum Rhois Glabra Fluidum, U. S.—Fluid Extract of Rhus Glabra.

Propenyl Preparation.

Spiritus Glonoini, U. S.—Spirit of Glonoin [Spirit of Nitroglycerin]. An alcoholic solution of glonoin [glyceryl (or Propenyl) trinitrate, or Nitroglycerin; $\text{C}_3\text{H}_5(\text{NO}_3)_3 = 226.58$], containing 1 per cent. by weight of the substance. A clear, colorless liquid, possessing the odor and taste of alcohol. Caution should be exercised in tasting it, since even a small quantity of it is liable to produce a violent headache. The same effect is produced when it is freely applied to the skin.

Acid Saccharine Fruits Containing Pectinous Bodies.

PECTIN.—A peculiar principle existing in certain fruits, and formed by the action of two other principles, *pectase* and *pectose*, upon each other during the process of ripening.

The moderate action of heat and water upon the fruits causes the citric, tartaric, or malic acid therein contained to act on the pectose, softening it and converting it into pectin. The pectin is then acted upon by the ferment *pectase*, which causes it to gelatinize on cooling, through the production of pectosic acid. This explains the formation of fruit jellies.

Syrupus Rubi Idæi, U. S.—Syrup of Raspberry.

VOLATILE OILS.

Volatile or *essential* oils are odorous principles found in various parts of plants, pre-existing, or produced by the reaction of certain constituents when brought in contact with water; or sometimes formed through destructive distillation, as the oil of amber; or they may be obtained from the animal kingdom, as the oil from ambergris.

Four Classes into which Volatile Oils may be Divided.—1st. Terpenes, or hydrocarbons, consisting of C and H, mostly with the formula $C_{10}H_{16}$; type, oil of turpentine. 2d. Oxygenated oils, or hydrocarbons containing oxygen; type, oil of cinnamon. 3d. Sulphurated oils, containing sulphur; type, volatile oil of mustard. 4th. Nitrogenated oils, a small class, containing hydrocyanic acid; type, oil of bitter almond.

Two Proximate Principles of which Volatile Oils Consist.—*Stearopten* and *eleasten*, the former congealing at a lower temperature than the latter. Some of the stearoptens are called camphors.

Action of Light and Air on Volatile Oils.—The fragrance of the oil is destroyed, ozone is developed, and the oils thicken, resinify, or deposit crystalline compounds.

Actions of Acids and Alkalies on Volatile Oils.—Strong nitric acid decomposes them with great rapidity; some oils react with iodine with explosive violence. Alkalies, with the exception of a few oils with which they form chemical compounds, have, generally, but little effect on volatile oils.

Principal Adulterations.—*Fixed oil*; detected by dropping the suspected oil on a piece of filtering paper; if a fixed oil is present, the stain will not evaporate on gently heating. *Alcohol*; detected by shaking in a graduated tube, with glycerine or water, which takes up the alcohol and decreases the volume of oil. Or if a large quantity of alcohol has been used, by setting fire to a small portion in a dish in a dark room, when the lambent blue flame of burning alcohol will be seen, in contrast to the yellow, sooty flame of volatile oil. Other tests are metallic sodium, calcium chloride, and aniline red. *Volatile oils, or cheaper grades of the same oil, or a cheaper oil having a similar odor*; test, by the olfactories.

Preparation.—Volatile oils are usually prepared from plants, and generally, either by distillation with water, distillation *per se*, expression, or solution.

1. *Distillation with Water.*—Put the substance from which the oil is to be extracted into a still, and add enough water to cover it; then distill, by a regulated heat, into a large refrigeratory. Separate the distilled oil from the water which comes over with it.

2. *Distillation per se.*—Distillation “by itself,” or without the use of water. Ex.—Certain oleoresins, copaiba, etc.

3. *Expression*.—The volatile oil of orange will illustrate this process. The advantage is, that heat is not employed; but the disadvantage is, that expressed oils have a small portion of albumen, which renders them turbid.

4. *Solution of Absorption*.—This operation is effected by maceration, digestion, percolation with carbon bisulphide or similar solvent, enflourage, or the pneumatic process. Used in cases where the oils are so delicate that they are decomposed by distillation, and exist in such small proportion in the plant that it does not pay to express them.

Maceration.—This is accomplished by allowing the odorous portion of a plant to stand in contact with a bland, inodorous, fixed oil. The oil absorbs the odor, and, after a certain length of time, it is strained. The odorous fixed oil is generally used in perfumes.

Digestion.—Similar to maceration, except moderate heat is employed.

Enflourage.—A cold process, and much used for delicate flowers; conducted by sprinkling the flowers on thin layers of purified, inodorous fat spread on glass. The glasses are fixed in frames resembling window sashes. The frames are piled in a stack, and left undisturbed for twelve hours or three or four days.

When strong pomade is desired, fresh flowers are added from time to time, as long as absorption continues, and the pomades are known commercially as Nos. 6, 12, 18, and 24, which indicate their strength. When the volatile oils are desired, they are extracted from the pomade by macerating the latter, in a finely chopped condition, in pure alcohol; afterward separating the small amount of fatty matter dissolved by the alcohol, by refrigerating and filtering.

Pneumatic Process.—Used only with very delicate volatile oils. It consists in forcing a current of air through a vessel filled with fresh flowers, into another vessel containing melted purified fat, with revolving circular plates half immersed therein. These circular plates become coated with fat, and absorb the odor from the perfumed air.

Percolation.—Odorous flowers are percolated with purified carbon disulphide. The latter is distilled, thus separating it from the volatile oil.

Official Products from the Aurantiaceæ.

AURANTII DULCIS CORTEX, U. S.—Sweet Orange Peel.—The rind of the fruit of *Citrus aurantium* owes its virtues to the volatile oil found in the epidermis. It also communicates a yellowish color to the preparations made with it.

Syrupus Aurantii, U. S.—Syrup of Orange.

Tinctura Aurantii Dulcis, U. S.—Tincture of Sweet Orange Peel.

AURANTII AMARI CORTEX, U. S.—Bitter Orange Peel.—The rind of the fruit of *Citrus vulgaris* contains *hesperidin* and a small quantity of volatile oil.

Extractum Aurantii Amari Fluidum, U. S.—Fluid Extract of Bitter Orange Peel.

Tinctura Aurantii, Amari, U. S.—Tincture of Bitter Orange Peel.

OLEUM AURANTII CORTICIS, U. S.—Oil of Orange Peel.—The volatile oil extracted, by mechanical means, from fresh orange peel

is of a pale, yellowish color, and has the composition of the terpenes, $C_{10}H_{16}$. Its sp. gr. is 0.860. Soluble in alcohol, and may be preserved by shaking it with one fourth of its volume of water, separating, and mixing with five times its measure of alcohol. Very prone to decomposition and rapidly acquires a terebinthinate odor. Used in making cologne water and bay rum and to flavor elixirs.

Elixir Aurantii, U. S.—Elixir of Orange.

Spiritus Aurantii, U. S.—Spirit of Orange.

AURANTII FLORES.—Orange Flowers.—The partly-expanded, fresh flowers of *Citrus vulgaris* and *Citrus aurantium*.

Aqua Aurantii Florum Fortior, U. S.—Stronger Orange Flower Water. Triple Orange Flower Water. Made by distilling 100 parts of water from 40 parts of recent orange flowers.

Aqua Aurantii Florum.—Orange Flower Water. Made by diluting the stronger water one-half.

OLEUM AURANTII FLORUM.—Oil of Orange Flowers. (*Oil of Neroli*).—The volatile oil, distilled from fresh orange flowers, is a brownish-yellow, very fragrant terpene ($C_{10}H_{16}$); sp. gr. 0.850 to 0.890; soluble in an equal weight of alcohol, and is well preserved by this addition. An inferior sort, *essence de petit grain*, is made by distilling the leaves and unripe fruit.

LIMONIS CORTEX, U. S.—Lemon Peel.—The rind of the recent fruit of *Citrus limonum* contains volatile oil and *hesperidin*.

OLEUM LIMONIS, U. S.—Oil of Lemon.—The volatile oil, extracted, by mechanical means, from fresh lemon peel, is a terpene, $C_{10}H_{16}$. When fresh, it has the fragrant odor of lemons; sp. gr. 0.850.

Spiritus Limonis, U. S.—Spirit of Lemon.

OLEUM BERGAMOTTÆ, U. S.—Oil of Bergamot. (*Oil of Bergamia*. *Pharm.* 1880.)—The volatile oil, extracted, by mechanical means, from the rind of the fresh fruit of *Citrus Bergamia*, var. *vulgaris*, is a terpene ($C_{10}H_{16}$); sp. gr. from 0.860 to 0.890; soluble, in all proportions, in alcohol and glacial acetic acid. This oil is usually prepared by expression, in the same manner as the oils of lemon and orange peel.

Officinal Products from the Labiatæ.

MENTHA PIPERITA, U. S.—Peppermint.—The leaves and tops of *Mentha piperita* contain about 2 per cent. of volatile oil.

OLEUM MENTHÆ PIPERITÆ, U. S.—Oil of Peppermint.—The volatile oil distilled from peppermint is a colorless or yellowish liquid, having the characteristic, strong odor of peppermint, a strongly aromatic taste, followed by a sensation of cold air when drawn into the mouth, and a neutral reaction; sp. gr. about 0.900. It is soluble in an equal weight of alcohol.

Menthol.—The oil of peppermint owes its odor to *menthol* ($C_{10}H_{20}O$), a stearopten obtained from it through fractional distillation, cooling, and crystallization. The crystals are beautiful, colorless needles, melting at $42^{\circ}C$ ($76^{\circ}F$.), boiling at $212^{\circ}C$. ($414^{\circ}F$.); insoluble in water, but soluble in alcohol, ether, chloroform, and benzin. It is largely used, com-

pressed into cones, as a remedy in neuralgia and headache. A portion of the oil has the composition $C_{10}H_{18}O$.

Aqua Mentha Piperita, U. S.—Peppermint Water.

Spiritus Mentha Piperita, U. S.—Spirit of Peppermint.

Trochisci Mentha Piperita, U. S.—Troches of Peppermint.

MENTHA VIRIDIS, U. S.—Spear-mint.—The leaves and tops of *Mentha viridis* contain from $\frac{1}{2}$ to 1 per cent. of volatile oil.

OLEUM MENTHÆ VIRIDIS, U. S.—Oil of Spear-mint.—The volatile oil distilled from spear-mint is a colorless or yellowish liquid, having the characteristic, strong odor of spear-mint, a hot, aromatic taste and a neutral reaction; sp. gr. about 0.900. It is soluble in an equal weight of alcohol, and contains an oxygenated oil, $C_{10}H_{14}O$, which is the odorous portion, and a terpene, $C_{10}H_{16}$.

Aqua Mentha Viridis, U. S.—Spear-mint Water.

Spiritus Mentha Viridis, U. S.—Spirit of Spear-mint.

MENTHOL, U. S.—Menthol.— $C_{10}H_{19}OH$ = 155.60. A stearo-
pten (having the character of a secondary alcohol), obtained from the official oil of peppermint, or from Japanese or Chinese oil of peppermint; colorless, acicular, or prismatic crystals, having a strong and pure odor of peppermint, and a warm, aromatic taste, followed by a sensation of cold when air is drawn into the mouth. Menthol is only slightly soluble in water, but imparts to the latter its odor and taste. It is freely soluble in alcohol, ether, chloroform, carbon disulphide, or glacial acetic acid.

OLEUM LAVANDULÆ.—Oil of Lavender.—The volatile oil distilled from the flowering tops, or the whole herb, of *Lavandula vera* is a colorless or yellowish liquid, having the aromatic odor of lavender, a pungent and bitterish taste, and a neutral reaction while fresh; sp. gr. about 0.890.

$C_{10}H_{16}O$, and compound ethers of $C_{10}H_{16}O$ and $C_{10}H_{18}O$.

Tinctura Lavandula Composita, U. S.—Compound Tincture of Lavender.

OLEUM LAVANDULÆ FLORUM, U. S.—Oil of Lavender Flowers.—The volatile oil distilled from fresh lavender is a colorless or yellowish liquid, having the fragrant odor of lavender flowers, a pungent and bitterish taste, and a neutral reaction while fresh; sp. gr. about 0.890.

Spiritus Lavandula, U. S.—Spirit of Lavender.

OLEUM ROSMARINI, U. S.—Oil of Rosemary.—The volatile oil distilled from rosemary is a colorless or yellowish liquid, having the characteristic, pungent odor of rosemary; a warm, somewhat camphoraceous taste, and a neutral or faintly acid reaction; sp. gr. about 0.900. It consists of a terpene, $C_{10}H_{16}$, and the oxygenated compounds, $C_{10}H_{16}O$, $C_{10}H_{18}O$.

HEDEOMA, U. S.—Hedeoma. (*Pennyroyal*).—The leaves and tops of *Hedeoma pulegioides*, and is frequently confounded with *Mentha pulegium*, or European pennyroyal, which yields an oil having a similar odor and properties.

OLEUM HEDEOMÆ, U. S.—Oil of Hedeoma. (*Oil of Pennyroyal*).—The volatile oil distilled from Hedeoma is a colorless or yellowish

liquid, of a pungent, mint-like odor and taste and a neutral reaction; sp. gr. about 0.940.

This is an oxygenated oil.

MARRUBIUM, U. S.—Marrubium. (*Horhound*).—The leaves and tops of *Marrubium vulgare* contain a volatile oil associated with resin, and a bitter principle, *Marrubiin*.

MELISSA, U. S.—Melissa. (*Balm*).—The leaves and tops of *Melissa officinalis* contain an oxygenated volatile oil.

OLEUM THYMI, U. S.—Oil of Thyme.—The volatile oil distilled from *Thymus vulgaris* is a colorless or pale-yellow, thin liquid, having a strong odor of thyme, a warm, pungent, and, afterward, cooling taste, and a neutral reaction; sp. gr. about 0.880. The oil, as prepared in the South of France, is known commercially as *oil of origanum*.

SALVIA, U. S.—Salvia. (*Sage*).—The leaves of *Salvia officinalis* contain a volatile oil, which consists of a terpene, $C_{10}H_{16}$, and an oxygenated portion, *salviol*, $C_{10}H_{18}O$.

SCUTELLARIA, U. S.—Scutellaria. (*Scullcap*).—*Scutellaria lateriflora* contains volatile oil, tannin, and a bitter principle.

Extractum Scutellariæ Fluidum, U. S.—Fluid Extract of Scutellaria.

Official Products of the Aromatic Umbelliferæ.

CARUM, U. S.—Caraway.—The fruit of *Carum carvi* contains about 5 per cent. of volatile oil, with a little fixed oil and other constituents.

OLEUM CARI, U. S.—Oil of Caraway.—The volatile oil distilled from caraway is a pale-yellow liquid, having the odor of caraway, and a sp. gr. of about 0.920. It consists of a terpene, *carvene*, $C_{10}H_{16}$, and *carvol*, $C_{10}H_{14}$.

FÆNICULUM, U. S.—Fennel.—The fruit of *Feniculum vulgare* contains about 5 per cent. of an oxygenated volatile oil, with 10 per cent. of fixed oil.

OLEUM FÆNICULI, U. S.—Oil of Fennel.—A volatile oil distilled from fennel; a pale-yellow liquid, having the odor of fennel, and a sp. gr. of not less than 0.960. Consisting of a terpene, $C_{10}H_{16}$, and *anethol*, $C_{10}H_{12}O$.

Aqua Fœniculi, U. S.—Fennel Water.

CORIANDRUM, U. S.—Coriander.—The fruit of *Coriandrum sativum* furnishes about 1 per cent. of an agreeable, aromatic oil, also about 10 per cent. of fixed oil.

OLEUM CORIANDRI, U. S.—Oil of Coriander.—A volatile oil distilled from Coriander.

A colorless or yellowish liquid, having the characteristic aromatic odor of coriander, a warm, spicy taste, and a neutral reaction; sp. gr. about 0.870; composed, principally, of $C_{10}H_{18}O$.

SUMBUL, U. S.—Sumbul.—The root of *Ferula sumbul* contains about $\frac{1}{2}$ per cent. of volatile oil and about 10 per cent. of a resinous compound having a musky odor.

Tinctura Sumbul, U. S.—Tincture of Sumbul.

ANISUM, U. S.—Anise.—The fruit of *Pimpinella anisum* contains about 2 per cent. of volatile oil and 3 per cent. of fixed oil.

OLEUM ANISI, U. S.—Oil of Anise.—A volatile oil distilled from anise or from illicium; colorless or yellowish, with the peculiar odor and taste of the fruit; sp. gr. about 0.976 to 0.990, increasing with age. At 10° to 15° C. (50° to 59° F.) it solidifies to a crystalline mass, which does not resume its fluidity until the temperature rises to about 17° C. (62.6° F.). *Oil of Illicium (Star-anise)* has nearly the same properties, except that it congeals at about 2° C. (35.6° F.). It consists of a small quantity of hydrocarbon, $C_{10}H_{16}$, but mainly of *anethol*, $C_{10}H_{12}O$, which is present in two modifications—one solid at ordinary temperatures and heavier than water (*anise camphor, solid anethol*), the other liquid and more volatile (*liquid anethol*). *Anethol*, both in the liquid and in the solid form, is present, and is the chief constituent of the oils of *anise, star-aniseed, and fennel*.

Aqua Anisi, U. S.—Anise Water.

Spiritus Anisi, U. S.—Spirit of Anise.

ILLCIUM, U. S.—Star-Anise.—The fruit of *Illicium anisatum* is the source of nearly all the commercial oil of anise.

Officinal Aromatic Products, with their Volatile Oils.

CINNAMOMUM CASSIA, U. S.—Cassia Cinnamon.—(*Cinnamomum, Pharm. 1880. Cassia Bark*).—The bark of the shoots of one or more undetermined species of *Cinnamomum* grown in China (Chinese Cinnamon).

Preparations.—Tinctura Cardamomi Composita; Tinctura Catechu Composita; Tinctura Lavandulæ Composita.

CINNAMOMUM SAIGONICUM, U. S.—The bark of an undetermined species of Cinnamon.

CINNAMOMUM ZEYLANICUM, U. S.—Ceylon Cinnamon.—(*Cinnamomum, Pharm. 1880.*)—The inner bark of the shoots of *Cinnamomum zeylanicum*.

Preparations.—Pulvis Aromaticus; Tinctura Cinnamomum.

OLEUM BETULÆ VOLATILE, U. S.—Volatile Oil of Betula.—(*Oil of Sweet Birch.*)—A volatile oil obtained by distillation from the bark of *Betula lenta*. It is identical with Methyl Salicylate, $CH_3C_7H_5O_3$, and nearly identical with Oil of Gaultheria.

OLEUM CINNAMOMI, U. S.—Oil of Cinnamon, Oil of Cassia.—A volatile oil distilled from Cassia Cinnamon.

There is no essential difference between the oil of Ceylon cinnamon and oil of cassia, except the latter is much the cheaper and more abundant of the two.

Oil of Ceylon Cinnamon has a slightly acid reaction; sp. gr. about 1.040. When cooled to -10° C. (14° F.) it remains clear, but at a lower temperature a solid portion separates from it. *Oil of Chinese Cinnamon* (Oil of Cassia) has the same properties, except that its specific gravity is about 1.060, and its odor and taste are not quite so agreeable.

Oil of cinnamon consists of *cinnamic aldehyd*, C_9H_8O , which, by mod-

crate oxidation, yields the corresponding cinnamic acid, $C_9H_8O_2$, but, by more energetic oxidation, yields benzoic acid, $C_7H_6O_2$.

Oil of Ceylon cinnamon, when it is not very fresh, contains cinnamic acid in sufficient quantity to give a permanent cloudiness to cinnamon water made from it.

Aqua Cinnamomi, U. S.—Cinnamon Water.

Spiritus Cinnamomi, U. S.—Spirit of Cinnamon.

CARYOPHYLLUS, U. S.—Cloves.—The unexpanded flowers of *Eugenia caryophyllata* contain about 16 per cent. of volatile oil, 10 per cent. of tannin, *caryophyllin*, $C_{10}H_{16}O$, a crystalline principle, and *eugenin*, $C_{10}H_{12}O_2$, also crystalline.

OLEUM CARYOPHYLLI, U. S.—Oil of Cloves.—A volatile oil distilled from cloves. When recently distilled, a very fluid, clear, and colorless liquid, but becomes yellowish by exposure, and ultimately reddish brown. It has the odor of cloves, a hot, acrid, aromatic taste, and a slightly acid reaction; its sp. gr. is about 1.050. It consists of two distinct oils, one lighter (a terpene), and the other heavier, than water. *Light oil of cloves* is colorless, is of the sp. gr. 0.918, and has the formula $C_{10}H_{16}$. *Heavy oil of cloves* is colorless at first, but darkens with age; has the odor and taste of cloves; is of the sp. gr. 1.079; boils at $243.3^\circ C.$ ($470^\circ F.$), and forms soluble and crystallizable salts with the alkalis. It consists of a phenol like compound, *eugenol* (eugenic acid), $C_{10}H_{12}O_2$, which has been found capable of conversion into *vanillin*.

PIMENTA, U. S.—Pimenta. (*Allspice*).—The nearly ripe fruit of *Eugenia pimenta* contains about 3 per cent. of volatile oil, with tannin, fat, resin, gum, sugar, etc.

OLEUM PIMENTA, U. S.—Oil of Pimenta. (*Oil of Allspice*).—A volatile oil distilled from pimenta. A colorless or pale-yellow liquid becoming darker and thicker by age and exposure to air; having a strong, aromatic, clove-like odor; a pungent, spicy taste, and a slightly acid reaction; sp. gr. about 1.040. It contains a terpene, $C_{10}H_{16}$, and eugenol, $C_{10}H_{12}O_2$.

OLEUM MYRCIÆ, U. S.—Oil of Myrcia. (*Oil of Bay*).—A volatile oil distilled from the leaves of *Myrcia acris*. A brownish or dark-brown liquid; of an aromatic, somewhat clove-like odor; a pungent, spicy taste, and a slightly acid reaction; sp. gr. about 1.040. It consists of two portions—a terpene, $C_{10}H_{16}$, and eugenol, $C_{10}H_{12}O_2$.

Spiritus Myrciæ, U. S.—Spirit of Myrcia (Bay Rum).

VANILLA, U. S.—Vanilla.—The fruit of *Vanilla planifolia* contains a trace of a volatile oil, 10 per cent. of fixed oil, resin, sugar, etc., and *vanillin*, $C_8H_8O_3$.

Tinctura Vanillæ, U. S.—Tincture of Vanilla.

OLEUM CAJUPUTI, U. S.—Oil of Cajuput.—A volatile oil distilled from the leaves of *Melaleuca cajuputi*. Very fluid, transparent; of a green color; a penetrating odor, analogous to that of cardamom, and a warm, pungent taste. Composition is $C_{10}H_{16}H_2O$. It is termed, chemically, *cajuputene hydrate*, or *cajuputol*. Sp. gr. about 0.920.

EUCALYPTUS, U. S.—Eucalyptus.—The leaves of *Eucalyptus*

globulus, collected from rather old trees, contain a volatile oil, resin, tannin, chlorophyl, fatty acid, etc.

Extractum Eucalypti Fluidum, U. S.—Fluid Extract of Eucalyptus.

EUCALYPTOL, U. S.—Eucalyptol. $C_{10}H_{18}O = 153.66$.—A neutral body obtained from the volatile oil of *Eucalyptus globulus*, and of some other species of *Eucalyptus*. A colorless liquid, having a characteristic, aromatic, and distinctly camphoraceous odor, and a pungent, spicy, and cooling taste.

OLEUM EUCALYPTI, U. S.—Oil of Eucalyptus.—A volatile oil distilled from the fresh leaves of *Eucalyptus globulus*, or *Eucalyptus amygdalina*, Labillardière, and some other species of *Eucalyptus*. A colorless or very pale-yellowish liquid, having a characteristic aromatic odor, a pungent, spicy, and cooling taste, and a neutral reaction; sp. gr. about 0.900. The larger portion of the oil consists of *eucalyptol*, $C_{10}H_{16}O$, which is very soluble in alcohol; there are also present two terpenes, $C_{10}H_{14}$ and $C_{10}H_{16}$.

MYRISTICA, U. S.—Nutmeg.—The kernel of the seed of *Myristica fragrans*, deprived of its testa, owes its activity to the presence of an oxygenated volatile oil.

OLEUM MYRISTICÆ, U. S.—Oil of Nutmeg.—A volatile oil distilled from nutmeg. A colorless or yellowish liquid having the characteristic odor of nutmeg, a hot, spicy taste, and a neutral reaction; sp. gr. 0.930.

It consists of a terpene, called myristicene, $C_{10}H_{16}$, and an oxygenated portion, $C_{10}H_{14}O$, myristicol.

Expressed oil of nutmeg, or *oil of mace*, is a fixed oil, made by expressing nutmegs between hot plates, or macerating them in carbon disulphide and distilling.

Spiritus Myristica, U. S.—Spirit of Nutmeg.

MACIS, U. S.—Mace.—The arillus of the fruit of *Myristica fragrans* contains about 70 per cent. of a light, volatile oil, chiefly a terpene, $C_{10}H_{16}$ (macene), and a fixed oil.

CASCARILLA, U. S.—Cascarilla.—The bark of *Croton eluteria*, Bennett, contains about 2 per cent. of an oxygenated volatile oil, a crystalline principle, *cascarillin*, $C_{12}H_{14}O_4$, 15 per cent. of resin, also tannin, gum, pectin, etc.

SASSAFRAS, U. S.—Sassafras.—The bark of the root of *Sassafras officinalis* contains volatile oil, sassafras, tannin, starch, resin, etc.

OLEUM SASSAFRAS, U. S.—Oil of Sassafras.—A volatile oil distilled from sassafras. A colorless or yellowish liquid, becoming darker and somewhat thicker by age and exposure to air; having the characteristic odor of sassafras, a warm, aromatic taste, and a neutral reaction; sp. gr. about 1.090.

METHYL SALICYLAS, U. S.—Methyl Salicylate. $CH_3C_7H_5O_3 = 151.64$. (*Artificial (or Synthetic) Oil of Wintergreen*.)—Methyl salicylate produced synthetically. A colorless or slightly yellowish liquid, having the characteristic, strongly aromatic odor and the sweetish, warm, and aromatic taste of Oil of Gaultheria, with the essential constituents of

which it is identical. It is wholly identical with Volatile Oil of Betula. (See *Oleum Betulae Volatile*.)

OLEUM GAULTHERIÆ, U. S.—Oil of Gaultheria. (*Oil of Wintergreen*.)—A volatile oil distilled from *Gaultheria procumbens*, consisting of a terpene, $C_{10}H_{16}$, termed *gaultherilene*, and methyl salicylate, $CH_3C_7H_5O_3$. It is the heaviest of all the volatile oils, having the sp. gr. 1.180. It is a colorless or yellow or reddish liquid; of a peculiar, strong, and aromatic odor; a sweetish, warm, and aromatic taste, and a slightly acid reaction; sp. gr. about 1.180. The reddish color is due to a trace of iron. Oil of Wintergreen is nearly identical with Volatile Oil of Betula.

Spiritus Gaultheriæ, U. S.—Spirit of Gaultheria.

CALAMUS, U. S.—Calamus. (*Sweet Flag*.)—The rhizome of *Acornus calamus* contains a volatile oil, having the composition of a terpene, $C_{10}H_{16}$, soft resin, a bitter principle, acorin, starch, and mucilage.

Extractum Calami Fluidum, U. S.—Fluid Extract of Calamus.

CARDAMOMUM, U. S.—Cardamom.—The fruit of *Elettaria cardamomum* contains 5 per cent. of an oxygenated volatile oil, of the sp. gr. 0.943, 10 per cent. of fixed oil, starch, mucilage, etc.

Tinctura Cardamomi, U. S.—Tincture of Cardamom.

Tinctura Cardamomi Composita, U. S.—Compound Tincture of Cardamom.

ZINGIBER, U. S.—Ginger.—The rhizome of *Zingiber officinale* owes its virtues to about 4 per cent. of volatile oil (terpene), having the composition $C_{10}H_{16}$, and a soft, pungent, aromatic resin, which is soluble in alcohol and ether.

Extractum Zingiberis Fluidum, U. S.—Fluid Extract of Ginger.

Oleoresina Zingiberis, U. S.—Oleoresin of Ginger.

Syrupus Zingiberis, U. S.—Syrup of Ginger.

Tinctura Zingiberis, U. S.—Tincture of Ginger.

Trochisci Zingiberis, U. S.—Troches of Ginger.

Stearoptens from Volatile Oils.

CAMPHORA, U. S.—Camphor.— $C_{10}H_{16}O$; 152.—A stearopten derived from *Cinnamomum camphora*, and purified by sublimation. It occurs in white, translucent masses, of a tough consistence and crystalline structure; readily pulverizable in the presence of a little alcohol, ether, or chloroform.

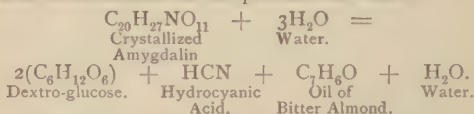
CAMPHORA MONOBROMATA, U. S.—Monobromated Camphor. $C_{10}H_{15}BrO$; 230.8.—Colorless, prismatic needles or scales, permanent in the air, and unaffected by light; mild, camphoraceous odor; mild, camphoraceous taste; neutral reaction. Made by heating camphor and bromine together, cooling, dissolving the crystalline mass in petroleum benzine, and recrystallizing.

THYMOL, U. S.—Thymol. $C_{10}H_{14}O$; 150.—Large crystals of the hexagonal system; nearly or quite colorless. It liquefies like camphor; aromatic, thyme-like odor; pungent, aromatic taste, with a very slight caustic effect upon the lips; neutral reaction. Made by the fractional distillation of the volatile oils of several plants, by which terpenes

are separated. The portion distilling above 190°C . (374°F .) is collected, agitated with solution of soda, to separate more of the terpenes, and cooled; the compound of thymol with soda is then decomposed by HCl .

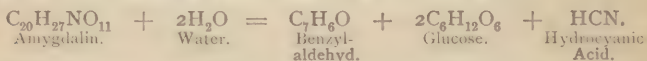
Officinal Substances Containing Nitrogenated and Sulphurated Oils, with Allied Products.

AMYGDALA AMARA, U. S.—Bitter Almond.—The seed of *Amygdalus communis*, var. *amara*, containing a glucoside called *amygdalin*, which splits into benzyl-aldehyd, or oil of bitter almond, hydrocyanic acid and glucose, under the influence of emulsin, or synaptase, a ferment, which becomes active in the presence of water.



OLEUM AMYGDALÆ AMARÆ, U. S.—Oil of Bitter Almonds.—A colorless or yellowish, thin, volatile oil, with a peculiar, aromatic odor; bitter and burning taste; neutral reaction. Obtained from bitter almond by maceration with water and subsequent distillation.

Preparation.—The bitter almond cake obtained after extracting the fixed oil is mixed with water, and distilled by passing a current of steam through it. The emulsin reacts on the amygdalin in presence of the aqueous vapor, and oil of bitter almond, or benzyl aldehyd, is produced.



As sweet almond does not contain amygdalin, oil of bitter almond cannot be prepared from it.

Artificial benzyl-aldehyd is made by the action of chlorine upon hot toluol, C_7H_8 . Benzyl-chloride, $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$, results, and this yields benzyl-aldehyd on distillation with lead nitrate and water, in an atmosphere of CO_2 . It is identical with oil of bitter almond.

Oil of Myrbane, or nitro-benzol, is an entirely different product, made by reacting on benzol with nitric acid. Its odor is similar to, but not identical with, oil of bitter almond. It is used for perfuming soaps.

Aqua Amygdalæ Amaræ, U. S.—Bitter Almond Water.

PRUNUS VIRGINIANA, U. S.—Wild Cherry.—The bark of *Prunus serotina*, collected in autumn, contains amygdalin, emulsin, tannin, bitter principle, starch, etc., and furnishes the same reaction with water with the production of oil of bitter almond and hydrocyanic acid as bitter almond.

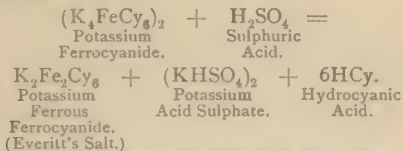
Infusum Pruni Virginianæ, U. S.—Infusion of Wild Cherry.

Syrupus Pruni Virginianæ, U. S.—Syrup of Wild Cherry.

Extractum Pruni Virginianæ Fluidum, U. S.—Fluid Extract of Wild Cherry.

ACIDUM HYDROCYANICUM DILUTUM, U. S.—Diluted Hydrocyanic Acid. (*Prussic Acid*).—A colorless liquid, of a character-

istic odor and taste, resembling bitter almonds; slight acid reaction; composed of 2 per cent. absolute hydrocyanic acid (HCN; 27) and 98 per cent. of alcohol and water. Made by distilling together potassium ferrocyanide, diluted alcohol, and sulphuric acid, and diluting to the proper strength with distilled water.



Scheele's Hydrocyanic Acid is a stronger solution, containing about 5 per cent. anhydrous acid.

SINAPIS ALBA, U. S.—White Mustard.—The seed of *Sinapis alba* Linné contains, *sinalbin*, $C_{30}H_{44}N_2O_{16}S_2$, a crystalline glucoside, which, under the influence of a peculiar ferment, *myrosin*, and water, is split into *acrylyl thiocyanate*, C_3H_7NOS , which is a pungent, volatile oil (this is not the official oil of mustard), *sinapine sulphate*, $C_{16}H_{23}NO_5 \cdot H_2SO_4$, and glucose. The seed contains, in addition, 20 per cent. of fixed oil, mucilage, gum, etc., but no starch.”—(Remington.)

SINAPIS NIGRA, U. S.—Black Mustard.—The seed of *Sinapis nigra* contains potassium myronate ($KC_{10}H_{18}NS_2O_{10}$), *myrosin*, a ferment, 25 per cent. of fixed oil, mucilage, etc. Under the influence of the myrosin and water, the potassium myronate is converted into allyl iso thiocyanate, or volatile oil of mustard. This action takes place at ordinary temperatures, and explains the pungency of aqueous mixtures of ground mustard.”—(Remington.)

Charta Sinapis, U. S.—Mustard Paper.

OLEUM SINAPIS VOLATILE, U. S.—Volatile Oil of Mustard.—A volatile oil obtained from black mustard by maceration with water, and subsequent distillation.

Chemically, this oil is *allyl iso-thiocyanate*; it is also called *sulphocyanide of allyl*. It is prepared artificially by distilling *allyl sulphate* with *potassium thiocyanate*. It is a colorless or pale-yellow liquid, having a very pungent and acrid odor and taste, and a neutral reaction; sp. gr. 1.017 to 1.021.

Linimentum Sinapis Compositum, U. S.—Compound Liniment of Mustard.

ALLIUM, U. S.—Garlic.—The bulb of *Allium sativum* contains a volatile sulphurated oil known as allyl sulphide ($C_3H_5)_2S$, mucilage, albumen, etc.

Syrupus Allii, U. S.—Syrup of Garlic.

OFFICINAL DRUGS AND PRODUCTS CONTAINING VOLATILE OIL WITH SOFT RESIN.

PIPER, U. S.—Pepper. (*Black Pepper*).—The unripe fruit of *Piper nigrum* contains piperine, a feeble alkaloid, 2 per cent. volatile oil (a terpene $C_{10}H_{16}$), a pungent resin.

Oleoresinæ Piperis, U. S.—Oleoresin of Pepper.

PIPERINA, U. S.—Piperine. $C_{17}H_{19}NO_3$; 285.—A proximate principle, of feebly alkaloidal power, prepared from pepper, and occurring, also, in other plants of the Nat. Ord. *Piperaceæ*.

Description.—Colorless or pale-yellowish, shining, four-sided prisms, permanent in the air; odorless; almost tasteless when first put in the mouth, but, on prolonged contact, producing a sharp and biting sensation; neutral reaction.

Preparation.—Pepper is treated with alcohol; the tincture evaporated to an extract; the extract treated with an alkaline solution, to saponify oleaginous matter; washing the undissolved portion with cold water; filtering; treating the matter left on the filter with alcohol, and evaporating the resulting solution spontaneously or by gentle heat; and, finally, purifying the crystals of piperine deposited by alternate solution in alcohol or ether, and crystallizing.

Piperine is decomposed by alkalies in alcoholic solution into *piperic acid*, $C_{12}H_{10}O_4$, and *piperidine*, $C_5H_{11}N$.

MATICO, U. S.—Matico.—The leaves of *Artanthe elongata* contain about 2 per cent. of volatile oil, a pungent resin, a crystalline principle, *artanthic acid*, and tannin.

Extractum Matico Fluidum, U. S.—Fluid Extract of Matico.

Tinctura Matico, U. S.—Tincture of Matico.

CUBEBA, U. S.—Cubeb.—The unripe fruit of *Cubeba officinalis* contains about 10 per cent. of volatile oil, 3 per cent. of resin, cubebin, *cubebic acid*, wax, fat, etc.

Extractum Cubebe Fluidum, U. S.—Fluid Extract of Cubeb.

Oleoresina Cubebe, U. S.—Oleoresin of Cubeb.

Trochisci Cubebe, U. S.—Troches of Cubeb.

Tinctura Cubebe, U. S.—Tincture of Cubeb.

OLEUM CUBEBAE, U. S.—Oil of Cubeb.—A volatile oil distilled from cubeb. A colorless, or pale greenish or yellowish liquid, having the characteristic odor of cubeb; a warm, camphoraceous, aromatic taste, and a neutral reaction; sp. gr. 0.920.

The oil contains a small amount of a hydrocarbon, $C_{10}H_{16}$, and two oils of the formula $C_{15}H_{24}$, one of which unites with HCl , while the other does not. Upon standing, it sometimes deposits rhomboidal prismatic crystals of a stearopten.

CAPSICUM, U. S.—Capsicum. (*Cayenne Pepper. African Pepper*).—The fruit *Capsicum fastigiatum*, containing capsaicin, $C_9H_{11}O_2$, traces of a volatile alkaloid and a volatile oil, fixed oil, resin, coloring

matter, etc. *Capsaicin* is in colorless crystals, volatile, intensely acrid, and soluble in alcohol, ether, and fixed oils.

Emplastrum Capsici, U. S.—Capsicum Plaster.

Extractum Capsici Fluidum, U. S.—Fluid Extract of Capsicum.

Oleoresina Capsici, U. S.—Oleoresin of Capsicum.

Tinctura Capsici, U. S.—Tincture of Capsicum.

COPAIBA, U. S.—Copaiba. (*Balsam of Copaiba*.)—The oleoresin of *Copaifera Langsdorffii* and of other species of *Copaifera* contains *copaivic acid*, volatile oil, and a bitter principle. Copaivic acid, $C_{20}H_{30}O_2$, the resinous mass left after distilling the oil, forms a series of amorphous salts.

Description.—A transparent or translucent, more or less viscid liquid, of a color varying from pale yellow to brownish yellow; sp. gr. 0.940 to 0.993; peculiar aromatic odor; persistently bitter and acrid taste.

Massa Copaibæ, U. S.—Mass of Copaiba.

Resina Copaibæ, U. S.—Resin of Copaiba.

OLEUM COPAIBÆ, U. S.—Oil of Copaiba.—A volatile oil distilled from copaiba.

It is a colorless or pale-yellowish liquid, having the characteristic odor of copaiba; a pungent, bitterish taste, and a neutral reaction; sp. gr. about 0.890. A hydrocarbon, consisting of $C_{10}H_{16}$ and $C_{15}H_{24}$.

OLEUM SANTALI, U. S.—Oil of Santal. (*Oil of Sandal Wood*.)—A volatile oil distilled from the wood of *Santalum album*.

A pale-yellowish or yellow liquid, of a peculiar, strongly aromatic odor, a pungent and spicy taste, and slightly acid reaction; sp. gr. about 0.945.

An oxygenated oil, consisting of $C_{15}H_{24}O$ and $C_{15}H_{26}O$.

OLEUM RUTÆ.—Oil of Rue.—A volatile oil distilled from *Ruta graveolens*.

A colorless or greenish-yellow liquid; of a characteristic, aromatic odor; a pungent, bitterish taste, and a neutral reaction; sp. gr. about 0.880.

This oil has been proved to be methyl-nonyl-ketone, $CH_3.CO.C_9H_{19}$.

SCOPARIUS, U. S.—Scoparius. (*Broom*.)—The tops of *Sarothamnus scoparius* contain a volatile oil, *sparteine*, $C_{15}H_{26}N_2$ (bitter oil), *scoparin*, $C_{21}H_{22}O_{10}$, fat, tannin, wax, etc.

BUCHU, U. S.—Buchu.—The leaves of *Barosma betulina* Bartling, *Barosma crenulata* Hooker, and *Barosma serratifolia* Willdenow, contain a volatile oil and resin, a bitter principle, mucilage, etc. The stearothen *diosphenol* is colored dark green by ferric chloride.

Extractum Buchu Fluidum, U. S.—Fluid Extract of Buchu.

SERPENTARIA, U. S.—Serpentaria. (*Virginia Snakeroot*.)—The rhizome and rootlets of *Aristolochia serpentaria* Linné and of *Aristolochia reticulata* Nuttall, contain 1 per cent. of volatile oil, a bitter principle, starch, sugar, etc.

Extractum Serpentariæ Fluidum, U. S.—Fluid Extract of Serpentaria.

Tinctura Serpentariæ, U. S.—Tincture of Serpentaria.

HUMULUS, U. S.—Hops.—The strobiles of *Humulus lupulus* con-

tain a small quantity of volatile oil; their bitterness is due to the resin and lupulin present.

Tinctura Humuli, U. S.—Tincture of hops.

LUPULINUM, U. S.—Lupulin. (*Lupulina, Pharm. 1870.*)—The glandular powder separated from the strobiles of *Humulus lupulus* contains 10 per cent. of volatile oil, which, on exposure, yields valericianic acid, trimethylamine, a bitter principle (lupamaric acid), $C_{82}H_{30}O_7$, resin, wax, and an alkaline liquid termed *lupuline*.

Extractum Lupulinae Fluidum, U. S.—Fluid Extract of Lupulin.

Oleoresina Lupulini, U. S.—Oleoresin of Lupulin.

CANNABIS INDICA, U. S.—Indian Cannabis. (*Indian Hemp.*)—The flowering tops of the female plant of *Cannabis sativa*, grown in the East Indies, contain a resinous substance, *cannabinine*, volatile oil, and tetanocannabinine.

Extractum Cannabis Indicae, U. S.—Extract of Indian Cannabis.

Extractum Cannabis Indicae Fluidum, U. S.—Fluid Extract of Indian Cannabis.

Tinctura Cannabis Indicae, U. S.—Tincture of Indian Cannabis.

VALERIANA, U. S.—Valerian.—The rhizome and rootlets of *Valeriana officinalis* contain about 1 per cent. of volatile oil, valericianic acid, resin, starch, tannin, etc.; there are also present some acetic and formic acids.

Abstractum Valerianæ, U. S.—Abstract of Valerian.

Extractum Valerianæ Fluidum, U. S.—Fluid Extract of Valerian.

Tinctura Valerianæ, U. S.—Tincture of Valerian.

Tinctura Valerianæ Ammoniata, U. S.—Ammoniated Tincture of Valerian.

VIBURNUM, U. S.—Black Haw.—The bark of *Viburnum prunifolium* contains valericianic acid, a bitter, resinous principle, *viburnin*, tannin, sugar, etc.

Extractum Viburni Fluidum, U. S.—Fluid extract of Viburnum.

VIBURNUM OPULUS, U. S.—Viburnum Opulus. [Cramp Bark.] The bark of *Viburnum Opulus*.

SAMBUCUS, U. S.—Sambucus. (*Elder.*)—The flowers of *Sambucus Canadensis* contain a little volatile oil and resin, sugar, mucilage, etc.

CHENOPODIUM, U. S.—Chenopodium. (*American Wormseed.*)—The fruit of *Chenopodium ambrosioides* contains a volatile oil, a small quantity of resin, and a bitter extractive.

OLEUM CHENOPODII, U. S.—Oil of Chenopodium. (*Oil of American Wormseed.*)—A volatile oil distilled from chenopodium.

A thin, colorless or yellowish, liquid; of a peculiar, aromatic odor; a pungent and bitterish taste, and a neutral reaction; sp. gr. about 0.920, increasing by age.

This oil consists of a terpene, $C_{10}H_{16}$, and an oxygenated portion, $C_{10}H_{16}O$.

OLEUM CADINI, U. S.—Oil of Cade. (*Oleum Juniperi Emphyreumaticum.*)—A product of the dry distillation of the wood of *Juniperus*

oxycedrus. A brownish or dark brown, clear, thick liquid, having a tarry odor, and an empyreumatic, burning, somewhat bitter taste. Sp. gr. about 0.990 at 15° C. (59° F.); almost insoluble in water, but imparting to it an acid reaction; partially soluble in alcohol; completely soluble in ether, chloroform, or carbon disulphide.

OLEUM JUNIPERI, U.S.—Oil of Juniper.—A volatile oil distilled from *Juniperus communis*.

A colorless or faintly greenish yellow liquid, becoming darker and thicker by age and exposure to air; having the characteristic odor of juniper; a warm, aromatic, somewhat terebinthinate and sweetish taste, and a neutral reaction; sp. gr. about 0.870.

Oil of juniper (berries) is a terpene, $C_{10}H_{16}$.

Spiritus Juniperi, U. S.—Spirit of Juniper.

Spiritus Juniperi Compositus, U. S.—Compound Spirit of Juniper.

SABINA, U. S.—Savine.—The tops of *Juniperus sabina* contain a terpene $C_{10}H_{16}$, and resin, with a trace of tannin.

Extractum Sabine Fluidum, U. S.—Fluid Extract of Savine.

OLEUM SABINÆ, U. S.—Oil of Savine.—A volatile oil distilled from savine. A colorless or yellowish liquid, becoming darker and thicker by age and exposure to air; having a peculiar, terebinthinate odor; a pungent, bitterish, and camphoraceous taste, and a neutral reaction; sp. gr. about 0.910.

This oil is a terpene, $C_{10}H_{16}$.

Official Drugs and Products Containing Volatile Oil Associated with Bitter Principle or Extractive.

ABSINTHIUM, U. S.—Absinthium. (*Wormwood*).—The leaves and tops of *Artemisia absinthium* contain 1 per cent. of an oxygenated volatile oil, which is chiefly absinthol, $C_{10}H_{16}O$. The bitter principle is *absinthin*, $C_{40}H_{58}O_9$. It also contains tannin, resin, and succinic acid.

TANACETUM, U. S.—Tansy.—The leaves and tops of *Tanacetum vulgare* contain a small quantity of volatile oil, which is freely soluble in alcohol. The bitter principle is *tanacetin*. It also contains tannin, fat, resin, etc.

ARNICÆ FLORES, U. S.—Arnica Flowers.—The flower heads of *Arnica montana* contain a trace of volatile oil, and a bitter principle, *arnicin*, with resin, coloring matter, etc.

Tinctura Arnicæ Florum, U. S.—Tincture of Arnica Flowers.

ARNICÆ RADIX, U. S.—Arnica Root.—The rhizome and roots of *Arnica montana* contain about 1 per cent. of volatile oil, the bitter principle *arnicin*, acrid resin, tannin, etc.

Extractum Arnicæ Radicis, U. S.—Extract of Arnica Root.

Emplastrum Arnicæ, U. S.—Arnica Plaster.

Extractum Arnicæ Radicis Fluidum, U. S.—Fluid Extract of Arnica Root.

Tinctura Arnicæ Radicis, U. S.—Tincture of Arnica Root.

CALENDULA, U. S.—Calendula. (*Marigold*).—The fresh, flowering herb of *Calendula officinalis* contains a small quantity of a volatile

oil, a bitter principle, gum, sugar, etc. *Calendulin* is not the active principle, having very little taste.

Tinctura Calendulæ, U. S.—Tincture of Calendula.

OLEUM ERIGERONTIS, U. S.—Oil of Erigeron. (*Oil of Fleabane*.)—A volatile oil distilled from the fresh, flowering herb of *Erigeron canadense*. A pale-yellow liquid, becoming darker and thicker by age and exposure to air; having a peculiar, aromatic, persistent odor; an aromatic, slightly pungent taste, and a neutral reaction; sp. gr. about 0.850.

This oil consists of a terpene, $C_{10}H_{16}$, and an oxygenated portion.

INULA, U. S.—Inula. (*Elecampane*.)—The root of *Inula helenium* contains acrid resin and a volatile oil, which are the active principles. Helenin, C_6H_8O , is inert. *Inulin*, a kind of starch, is abundant.

ANTHEMIS, U. S.—Anthemis. (*Chamomile*.)—The flower-heads of *Anthemis nobilis*, collected from cultivated plants, contain a volatile oil and a bitter principle, which has been called *anthemic acid*.

MATRICARIA, U. S.—Matricaria. (*German chamomile*.)—The flower-heads of *Matricaria chamomilla* contain a dark-blue volatile oil; the bitter principle is termed *anthemic acid*.

EUPATORIUM, U. S.—Eupatorium. (*Thoroughwort*, *Boneset*.)—The leaves and flowering tops of *Eupatorium perfoliatum* contain a volatile oil and resin, *eupatorin*, gum, tannin, sugar, etc.

Extractum Eupatorii Fluidum, U. S.—Fluid Extract of Eupatorium.

GRINDELIA, U. S.—Grindelia.—The leaves and flowering tops of *Grindelia robusta* contain a volatile oil and a bitter and resinous principle.

Extractum Grindeliæ Fluidum, U. S.—Fluid Extract of Grindelia.

MEZEREUM, U. S.—Mezereum.—The bark of *Daphne Mezereum* and other species of *Daphne* contains *daphnin*, $C_{31}H_{34}O_{19}$, a glucoside, associated with an acrid, soft resin, and oil.

Extractum Mezerei Fluidum, U. S.—Fluid Extract of Mezereum.

Extractum Mezerei, U. S.—Extract of Mezereum.

Unguentum Mezerei, U. S.—Mezereum Ointment.

ASPIDIUM, U. S.—Aspidium. (*Filix Mas*, *Pharm.* 1870. *Male Fern*.)—The rhizome of *Dryopteris Filix-mas* Schott, and of *Dryopteris marginalis* Asa Gray, contains *filiic acid*, $C_{14}H_{18}O_5$, filix red, filitanic acid, fixed oil, etc.

Oleoresina Aspidii, U. S.—Oleoresin of Aspidium.

CYPRIPEDIUM, U. S.—Cypripedium. (*Ladies' Slipper*.)—The rhizome and rootlets of *Cypripedium pubescens* Willdenow, and of *Cypripedium parviflorum* Salisbury, contain resins, an acrid principle, volatile oil, tannin, starch, etc.

Extractum Cypripedii Fluidum, U. S.—Fluid Extract of Cypripedium.

PHYTOLACCÆ RADIX, U. S.—Phytolacca Root. (*Poke Root*.)—The root of *Phytolacca decandra* contains an acrid resin, tannin, mucilage, etc.

PHYTOLACCÆ FRUCTUS, U. S.—*Phytolacca* Fruit. (*Phytolaccæ Bacca*, *Pharm.* 1880. *Poke Berry*.)—The fruit of *Phytolacca decandra* contains reddish-purple coloring-matter, sugar, gum, etc.

STILLINGIA, U. S.—*Stillingia*. (*Queen's Root*.)—The root of *Stillingia yuktatica* contains an acrid resin, starch, fixed oil, gum, etc.

Extractum Stillingiæ Fluidum, U. S.—Fluid Extract of *Stillingia*.

PYRETHRUM, U. S.—*Pyrethrum*. (*Pellitory*.)—The root of *Anacyclus pyrethrum* contains an acrid, brown resin, and fixed oils, inulin, mucilage, etc.

Tinctura Pyrethri, U. S.—Tincture of *Pyrethrum*.

XANTHOXYLUM, U. S.—*Xanthoxylum*. (*Prickly Ash*.)—The bark of *Xanthoxylum fraxinum* Willdenow, and of *Xanthoxylum carolinianum* Lambert, contains a soft resin, a crystalline resin, a bitter principle, and an acrid, green oil.

Extractum Xanthoxyli Fluidum, U. S.—Fluid Extract of *Xanthoxylum*.

IRIS, U. S.—*Iris*. (*Blue Flag*.)—The rhizome and rootlets of *Iris versicolor* contain a bitter resin. There are also present sugar, gum, tannin, and fatty matter.

Extractum Iridis Fluidum, U. S.—Fluid Extract of *Iris*.

Extractum Iridis, U. S.—Extract of *Iris*.

CIMICIFUGA, U. S.—*Cimicifuga*. (*Black Snakeroot*.)—The rhizome and rootlets of *Cimicifuga racemosa* contain resin, an acrid principle (possibly an alkaloid), starch, tannin, gum, etc.

Extractum Cimicifugæ Fluidum, U. S.—Fluid Extract of *Cimicifuga*.

Tinctura Cimicifugæ, U. S.—Tincture of *Cimicifuga*.

PULSATILLA, U. S.—*Pulsatilla*. The herb of *Anemone pulsatilla* and *Anemone pratensis* Linné, and of *Anemone patens* Linné, var. *Nuttalliana* Gray, collected soon after flowering. Should be carefully preserved, and not be kept longer than one year; contains an acrid, odorous resinous substance, coloring matter, gum, etc. The acrid principle may be converted into *anemonin*, $C_{15}H_{12}O_6$, which, through the action of alkalies, becomes *anemonic acid*.

APOCYNUM, U. S.—*Apocynum*. (*Canadian Hemp*.)—The root of *Apocynum cannabinum* contains resin, *apocynin*, *apocynein*, bitter extractive, tannin, etc.

ASCLEPIAS, U. S.—*Asclepias*. (*Pleurisy Root*.)—The root of *Asclepias tuberosa* contains resins, volatile principle, tannin, mucilage, etc.

LACTUCARIUM, U. S.—*Lactucarium*.—The concrete milk-juice of *Lactuca virosa* contains a bitter resinous principle, *lactucin*, $C_{11}H_{12}O_3 \cdot H_2O$, *lactucic acid* (bitter and crystalline), *lactucopierin* (bitter and amorphous), *lactucerin* in large quantity, nearly 60 per cent. (this principle is inert and crystallizable), caoutchouc, resin, asparagin, volatile oil, mucilage, etc.

Extractum Lactucarii Fluidum, U. S.—Fluid Extract of *Lactucarium*.

Syrubus Lactucarii, U. S.—Syrup of *Lactucarium*.

RESINS, OLEORESINS, GUM-RESINS, AND BALSAMS.

What are Resins? Natural or induced solid or semi-solid exudations from plants, characterized by being insoluble in water, mostly soluble in alcohol, uncrystallizable, and softening and melting at a moderate heat.

What are they chemically? Mixed products. Some of them are acids, and combine with alkalies, forming soaps, as in the case of common resin. They are commonly the oxidized terpenes of plants.

Describe them. When pure, they are usually transparent, hard, and brittle; when they contain water, are opaque and no longer hard, and brittle.

Into what three Classes are they usually Divided? Natural Oleoresins (oil and resin), generally obtained by incising the trunks of trees which contain them; ex., turpentine. Gum resins; natural mixtures of gum and resin—usually exudations from plants; ex., myrrh. Balsams, resinous substances which contains benzoic, cinnamic, or analogous acids; ex., balsam of tolu.

TEREBINTHINA, U. S.—Turpentine.—A concrete oleoresin obtained from *Pinus australis* and from other species of *Pinus*; contains abietic anhydride, which may be converted into abietic acid, $C_{44}H_{61}O_5$, a bitter principle, and 25 per cent. of volatile oil.

OLEUM TEREBINTHINÆ, U. S.—Oil of Turpentine.—A volatile oil distilled from turpentine; has the composition $C_{10}H_{16}$, and is the type of the terpenes. It is a thin, colorless liquid, of a characteristic odor and taste, becoming stronger and less pleasant by age and exposure to air, and of a neutral or faintly acid reaction; sp. gr. 0.855 to 0.870.

Linimentum Terebinthinæ, U. S.—Turpentine Liniment.

OLEUM TEREBINTHINÆ RECTIFICATUM, U. S.—Rectified Oil of Turpentine.—A thin, colorless liquid, having the general properties mentioned under Oil of Turpentine; sp. gr. 0.855 to 0.865 at 15° C. (59° F.); testing point about 160° C. (320° F.). Made by distilling Oil of Turpentine with Lime Water.

TEREBENUM, U. S.—Terebene, $C_{10}H_{16} = 135.7$. A liquid consisting chiefly of Pinene, and containing not more than very small portions of Terpinene and Dipentene. A colorless, or slightly yellowish, thin liquid, having a rather agreeable, thyme-like odor, and an aromatic, somewhat terebinthinate taste; sp. gr. about 0.862 at 15° C. (59° F.). Only slightly soluble in water, but soluble in an equal volume of alcohol, glacial acetic acid, or carbon disulphide.

TERPINI HYDRAS, U. S.—Terpin Hydrate, $C_{10}H_{18} (OH)_2 \cdot \frac{1}{2} H_2O = 189.58$. The hydrate of the diatomic alcohol terpin. Colorless, lustrous, rhombic prisms, nearly odorless, and having a slightly aromatic and somewhat bitter taste. Permanent in the air. Soluble at 15° C. (59° F.) in about 50 parts of water, and in 10 parts of alcohol, in 32 parts of boiling water, and in 2 parts of boiling alcohol; also soluble in about 100

parts of ether, 200 parts of chloroform, or 1 part of boiling glacial acetic acid.

RESINA, U. S.—Resin. (*Colophony*).—The residue left after distilling off the volatile oil from turpentine consists of abietic anhydride, which passes into abietic acid when treated with diluted alcohol. It is a transparent, amber-colored substance, hard, brittle, with a glossy and shallow conchoidal fracture, and having a faintly terebinthinate odor and taste; sp. gr. 1.070 to 1.080.

Ceratum Resinæ, U. S.—Resin Cerate.

Emplastrum Resinæ, U. S.—Resin Plaster.

TEREBINTHINA CANADENSIS, U. S.—Canada Turpentine. (*Balsam of Fir*).—A liquid oleoresin obtained from *Abies balsamea*. It contains resin, associated with a terpene, $C_{10}H_{16}$, and a small quantity of a bitter principle. It is a yellowish or faintly greenish, transparent, viscid liquid; of an agreeable, terebinthinate odor, and a bitterish, slightly acrid taste.

MASTICHE, U. S.—Mastic.—A concrete, resinous exudation from *Pistacia Lentiscus*, containing a resin (masticic acid, $C_{20}H_{32}O_2$), which is soluble in strong alcohol; also masticin, a resinous principle, which is insoluble in alcohol; a small quantity of volatile oil is likewise present.

PIX BURGUNDICA, U. S.—Burgundy Pitch.—The prepared, resinous exudation of *Abies excelsa* contains resin, a small quantity of a terpene, $C_{10}H_{16}$, and water.

Emplastrum Picis Burgundicæ, U. S.—Burgundy Pitch Plaster.

Emplastrum Picis cum Cantharide, U. S.—Pitch Plaster with Cantharides.

PIX CANADENSIS.—Canada Pitch. (*Hemlock Pitch*).—The prepared resinous exudation of *Abies Canadensis* contains resins, a small quantity of a terpene, $C_{10}H_{16}$, and water.

Emplastrum Picis Canadensis, U. S.—Canada Pitch Plaster.

AMMONIACUM, U. S.—Ammoniac.—A gum resin obtained from *Dorema Ammoniacum* contains about 25 per cent. of gum, 70 per cent. of resin, and about 3 per cent. of volatile oil. The resin is remarkable for yielding resorcin when fused with potassa.

Mistura Ammoniaci, U. S.—Ammoniac Mixture.

Emplastrum Ammoniaci, U. S.—Ammoniac Plaster.

Emplastrum Ammoniaci cum Hydragyro, U. S.—Ammoniac Plaster with mercury.

ASAFÆTIDA, U. S.—Asafetida.—A gum-resin obtained from the root of *Ferula narthex* Boissier, and of *Ferula scorodosma* Benthham et Hooker. It contains a sulphurated volatile oil (ferulyl sulphide), about 20 per cent. of gum, and 70 per cent. of resin.

Mistura Asafætida, U. S.—Asafetida Mixture.

Tinctura Asafætida, U. S.—Tincture of Asafetida.

Emplastrum Asafætida, U. S.—Asafetida Plaster.

Pilulæ Asafætida, U. S.—Pills of Asafetida.

ELASTICA, U. S.—India-Rubber. (*Caoutchouc*).—The prepared milk juice of various species of *Hevea*, known in commerce as Para Rubber.

MYRRHA, U. S.—Myrrh.—A gum-resin obtained from *Balsamodendron myrrha*: contains 3 per cent. of an oxygenated volatile oil, a bitter principle, and about 30 per cent. of gum and 60 per cent. of resin.

Tinctura Myrrhae, U. S.—Tincture of Myrrh.

GUAIACI LIGNUM, U. S.—Guaiacum Wood.—The heart-wood of *Guaiacum officinale* and of *Guaiacum sanctum* owes its virtues to resin, which is present, usually, to the amount of 25 per cent.

GUAIACI RESINA, U. S.—Guaiac.—The resin of the wood of *Guaiacum officinale* consists of *guaiacic acid* ($C_{12}H_{16}O_6$), *guaiaconic acid* ($C_{19}H_{20}O_5$), *guaiaretic acid* ($C_{20}H_{26}O_4$), beta resin, gum, etc.

Tinctura Guaiaci, U. S.—Tincture of Guaiac.

Tinctura Guaiaci Ammonjata, U. S.—Ammoniated Tincture of Guaiac.

BALSAMUM TOLUTANUM, U. S.—Balsam of Tolu.—A balsam obtained from *Myroxylon toluifera* contains *cinnamic* and *benzoic acids*, resins, a volatile oil called *benzyl benzoate*, $C_7H_5(C_7H_7)O_2$, *benzyl cinnamate*, a terpene, $C_{10}H_{16}$, termed *tolene*, and other unimportant constituents.

Tinctura Tolutana, U. S.—Tincture of Tolu.

Syrupus Tolutanus, U. S.—Syrup of Tolu.

BALSAMUM PERUVIANUM, U. S.—Balsam of Peru.—The balsam obtained from *Myroxylon pereiwa* contains *cinnamic* and *benzoic acids*, *benzyl cinnamate*, $C_9H_7(C_7H_7)O_2$, resin, *benzyl benzoate*, stilbene, etc.

Description.—A thick liquid, brownish-black in bulk, reddish-brown and transparent, in thin layers, having a syrupy consistence; somewhat smoky, but agreeable and balsamic, odor; warm, bitter, afterward acid taste.

BENZOINUM, U. S.—Benzoin.—The balsamic resin obtained from *Styrax benzoin*, contains benzoic acid, cinnamic acid ($C_9H_8O_2$), a fragrant, volatile oil, and resins; in some varieties vanillin is found.

Adeps Benzoïnatus, U. S.—Benzoinated Lard.

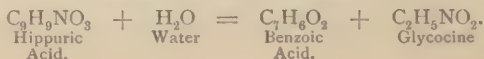
Tinctura Benzoini, U. S.—Tincture of Benzoin.

Tinctura Benzoini Composita, U. S.—Compound Tincture of Benzoin.

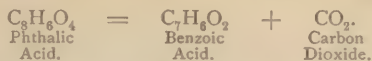
STYRAX, U. S.—Storax.—The balsam prepared from the inner bark of *Liquidambar orientalis* contains cinnamic acid, benzoic acid, *stryacin*, $C_9H_7(C_9H_9O_2)$, *storesin*, $C_{36}H_{58}O_3$, *ethyl cinnamate*, $C_9H_7(C_2H_5)O_2$, *phenyl propyl cinnamate*, $C_9H_7(C_9H_{17})O_2$, *styröl*, C_8H_8 , a fragrant hydrocarbon, and a resinous substance not yet investigated.

ACIDUM BENZOICUM, U. S.—Benzoic Acid. $HC_7H_5O_2$; 122.—White, lustrous scales, or friable needles, permanent in the air; slight aromatic odor of benzoin; a warm, acid taste; acid reaction. It is found natural in benzoin, balsam of tolu, etc., but is usually made artificially—

1. From the urine of cattle, by treating it with lime, evaporating, decomposing the lime hippurate with HCl, purifying the hippuric acid with animal charcoal, and treating with HCl, when benzoic acid and glycocine are produced.



2. From *naphthalin*, $C_{10}H_8$, by treating it with HNO_3 ; *phthalic acid* is produced, which, when heated with excess of $Ca(HO)_2$, yields calcium benzoate and carbonate.



3. From trichlormethyl-benzol, a coal-tar hydrocarbon from toluol, C_7H_8 , by heating with zinc chloride and acetic acid, by which benzoic acid is formed and HCl liberated.

FIXED OILS, FATS, AND SOAPS.

What is the Source of Fixed Oils and Fats, and how are they Distinguished? They are obtained from both the vegetable and animal kingdoms. *Characteristics*.—Greasy to the touch, leave a permanent oily stain on paper; insoluble in water, but soluble in ether, chloroform, carbon disulphide, benzol, benzin, turpentine, and volatile oils, usually mixing with one another without separating; when pure, generally colorless or of a pale yellow color, with distinctive odor and taste, often caused by impurities, as they are rendered odorless and tasteless by refining them. When heated moderately, if solid, they melt; if liquid, they become thinner; decomposed by heating strongly in the air, with evolution of offensive vapors, they burn with a sooty flame and much heat. Sp. gr. 0.870 to 0.985. On exposure to air, they acquire an acid, disagreeable taste and acid reaction, owing to a change that occurs, termed rancidity, believed to be due to impurities, like albuminous substances, which act as ferments, induce decomposition, liberate the fatty acids, and produce volatile, odorous acids, like caproic, caprylic, butyric, and valerianic acids. Rancid oils may often be purified by shaking thoroughly with hot water, then with a cold solution of CO_2 , and washing with cold water.

What are Fixed Oils chemically? They are ethers of the higher members of the fatty acids, the alcohol being glycerin and the radical glyceryl. As they consist, in most cases, of two or three proximate principles, called olein, palmitin or stearin in combination with glyceryl, they are sometimes called glycerides of oleic, palmitic, and stearic acids. The consistency of fixed oils and fat vary, on account of these proximate principles, which occur in various proportions. Olein is liquid, the other two solid. Almond oil being principally composed of olein, is, at ordinary temperatures, liquid; tallow being largely stearin, is solid at the same temperatures.

What is Olein? The oleate of the triad radical glyceryl, having the chemical composition $C_3H_5(OC_{18}H_{33}O_2)_3$, obtained by treating oils or fats with boiling alcohol, cooling, to deposit the concrete principles, the olein remaining in solution, which is obtained by evaporating off the alcohol, or by compressing one of the solid fats, or a liquid fat concentered by cold, between folds of bibulous paper, which absorb the olein and give it up afterward by compressing under water.

Describe Olein. It is a liquid of oily consistence, congealing at -6°

C. (21.2° F.); colorless, when pure; with little odor and a sweetish taste; insoluble in water, soluble in boiling alcohol and ether.

What is Palmitin? The glyceride of palmitic acid, or tripalmitate of glyceryl.

What is Stearin? A glyceride of stearic acid, $C_3H_5(OC_{17}H_{33}O)_3$, and has been formed synthetically by heating a mixture of these two materials to 280°–300° C.

Describe it and its Method of Preparation. A white, opaque mass, of a pearly appearance as crystallized from ether, pulverizable, fusible at 66.5° C. (152° F.), soluble in boiling alcohol and ether, nearly insoluble in those liquids cold, insoluble in water. Prepared by dissolving suet in hot oil of turpentine, cooling, expressing with unsized paper, dissolving in hot ether, which deposits the stearin on cooling.

What is Margarin? A compound of stearin and palmitin—once regarded as a principle.

What is Stearic Acid? A firm, white solid, like wax, with chemical composition $C_{18}H_{36}O_2$, fusible at 69.2° C. (157° F.), greasy to the touch, pulverizable, soluble in alcohol, very soluble in ether, insoluble in water.

Describe Palmitic Acid. Palmitic acid, $C_{16}H_{32}O_2$, forms a white, scaly mass, melting at 62° C. (143.6° F.).

Describe Oleic Acid. An oily liquid, soluble in alcohol and ether, lighter than water, in which it is insoluble; crystallizable in needles at a temperature a little below zero C. (32° F.); having a slight smell and pungent taste; chemical composition, $C_{18}H_{34}O_2$.

AMYGDALA DULCIS, U. S.—Sweet Almond.—The seed of *Amygdalus communis*, var. *dulcis*, contains about 40 per cent. of fixed oils, protein compounds (*conglutin* and *amandin*), sugar, mucilage, etc.

Mistura Amygdalæ, U. S.—Almond mixture.

Syrupus Amygdalæ, U. S.—Syrup of Almond.

OLEUM AMYGDALÆ EXPRESSUM, U. S.—Expressed Oil of Almond.—A fixed oil expressed from bitter or sweet almond. Clear and colorless, or slightly tinged of a greenish-yellow; nearly inodorous; bland, sweetish taste; its sp. gr. is from 0.914 to 0.920. It consists principally of olein 70 per cent.

OLEUM OLIVÆ, U. S.—Olive Oil.—A fixed oil, expressed from the ripe fruit of *Olea Europea*. It is a pale yellow or light greenish-yellow, oily liquid; almost devoid of odor; nutty, oleaginous taste, with a faintly acrid after-taste; neutral reaction.

OLEUM GOSSYPII SEMINIS, U. S.—Cotton Seed Oil.—A fixed oil expressed from the seed of *Gossypium herbaceum*, and other species of *Gossypium*, and subsequently purified.

OLEUM SESAMI, U. S.—Oil of Sesamum. (*Bennè Oil*).—The fixed oil expressed from the seed of *Sesamum indicum* consists of olein (70 per cent.), palmitin, stearin, and myristicin.

OLEUM LINI, U. S.—Linseed Oil.—A fixed oil expressed from

flaxseed without the use of heat. It consists mainly of *linolein*, which, by exposure, becomes *linoxyn*, $C_{32}H_{54}O_{11}$, *myristin* and *palmitin* are also present. It is a yellowish or yellow, oily liquid, having a slight, peculiar odor, a bland taste, and a neutral reaction.

PEPO, U. S.—Pumpkin Seed.—The seed of *Cucurbita pepo* contains about 40 per cent of fixed oil, starch, protein compounds, a little acrid resin, sugar, etc.

OLEUM RICINI, U. S.—Castor Oil.—A fixed oil expressed from the seed of *Ricinus communis*.

Preparation—Castor oil has been obtained from the seed in four ways :

1. By cold expression ; 2. By expression with heat ; 3. By percolation with alcohol ; 4. By decoction. The first method produces the best oil. It is an almost colorless, transparent, viscid liquid, of a faint, mild odor ; a bland, afterward slightly acrid, and generally offensive taste, and a neutral reaction ; sp. gr. 0.950 to 0.970. It contains *ricinolein* and *palmitin*.

OLEUM TIGLII, U. S.—Croton Oil.—A fixed oil expressed from the seed of *Croton tiglium*. It is a pale-yellow or brownish-yellow, somewhat viscid and slightly fluorescent liquid ; having a slight fatty odor ; a mild, oily, afterward acrid, burning taste, and a slightly acid reaction ; sp. gr. 0.940 to 0.955. Neither the purgative principle nor the vesicating principle has been isolated. *Crotolal*, $C_{18}H_{28}O_4$, is said to be present.

OLEUM THEOBROMATII, U. S.—Oil of Theobroma. (*Oil of Theobroma*, Pharm. 1880. *Butter of Cacao*.)—A fixed oil expressed from the seed of *Theobroma cacao* by expressing the kernels of the "chocolate nut" between hot iron plates, and running the product into moulds. The yield is about 40 per cent. It is a yellowish-white solid, having a faint, agreeable odor ; a bland, chocolate-like taste, and a neutral reaction. It melts between 30° and 35° C. (86° to 95° F.).

Chemically, it is a mixture of stearin, palmitin, olein, arachin, and laurin, and, owing to its low fusing point and its property of becoming solid at a temperature just above the fusing point, it is valuable in pharmacy in making suppositories.

LYCOPodium, U. S.—Lycopodium.—The sporules of *Lycopodium clavatum* and of other species of *Lycopodium* contain 47 per cent. of fixed oil, with minute quantities of volatile bases.

ACIDUM OLEICUM, U. S.—Oleic Acid. $HC_{18}H_{35}O_2$; 282.—A yellowish, oily liquid, gradually becoming brown, rancid, and acid when exposed to air ; odorless, or nearly so ; tasteless ; when pure, of a neutral reaction ; sp. gr. 0.900 to 0.910. Obtained as a by-product in the manufacture of candles from fats.

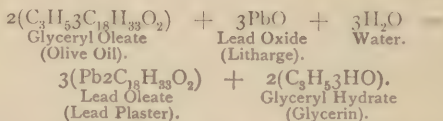
Red oil is crude oleic acid.

ACIDUM STEARICUM, U. S.—Stearic Acid. $HC_{18}H_{35}O_2$; 283.38.—An organic acid, in its commercial, more or less impure, form, usually obtained from the more solid fats, chiefly tallow. A hard, white, somewhat glossy solid, odorless and tasteless, and permanent in the air. Insoluble in water ; soluble in about 45 parts of alcohol at 15° C. (59° F.) ; readily soluble in boiling alcohol and ether.

GLYCERINUM, U. S.—Glycerin. (*Glycerina, Pharm. 1870.*)—A clear, colorless liquid, of syrupy consistence, oily to the touch, hygroscopic; odorless; very sweet and slightly warm to the taste; neutral reaction. Obtained by the decomposition of fats or fixed oils, and containing not less than 95 per cent. of absolute glycerin ($C_3H_5(HO)_3$; 92).

Preparation.—Glycerin is made in several ways:—

1. Through the saponification of fats and oils, in making soap or lead plaster.



2. By the decomposition of fats and oils through pressure and super-heated steam, whereby the fats, which are *glycerides*, or ethers of the fatty acids, are broken up into glycerin and fatty acids, the water supplying the elements of hydrogen and oxygen necessary for that change. The decomposition of *stearin* in this way will illustrate:—



In this, its present form, it is known as *distilled glycerin*.

Glycerin is the hydrate of the radical *glyceryl*, therefore an alcohol, and is sometimes called *glycerol* or *glyceric alcohol*. It is triatomic, and one, two, or three of the hydrogen atoms may be replaced by monad radicals.

SAPO, U. S.—Soap. (*White Castile Soap.*)—Soap prepared from soda and olive oil. It is a white or whitish solid, hard, yet easily cut when fresh; with a slight, peculiar odor; free from rancidity; disagreeable, alkaline taste; alkaline reaction.

Emplastrum Saponis, U. S.—Soap Plaster.

Linimentum Saponis, U. S.—Soap Liniment.

SAPO MOLLIS, U. S.—Soft Soap. (*Sapo Viridis, Pharm. 1880. Green Soap.*)—A soft soap, generally imported from Germany; prepared from potassa and various fixed oils, containing but little stearin. It is a soft, greenish-yellow, unctuous jelly, having a peculiar odor, which should be free from rancidity, and an alkaline reaction.

Linimentum Saponis Mollis, U. S.—Liniment of Soft Soap.

Unsaponifiable Fats and Petroleum Products.

PETROLATUM LIQUIDUM, U. S.—Liquid Petrolatum.—A mixture of hydrocarbons, chiefly of the marsh-gas series, obtained by distilling off the lighter and more volatile portions from petroleum, and purifying the residue when it has the desired consistence. A colorless, or more or less yellowish, oily, transparent liquid, without odor or taste, or giving off, when heated, a faint odor of petroleum. Sp. gr. about 0.875 to 0.945 at 15° C. (57° F.). Insoluble in water; scarcely soluble in cold or hot alcohol, but soluble in boiling absolute alcohol, and readily soluble in

ether, chloroform, carbon disulphid, oil of turpentine, benzin, benzol, and fixed or volatile oils.

PETROLATUM MOLLE.—Soft Petrolatum. (*Petrolatum, Pharm. 1880. Soft Petroleum Ointment.*)—A fat like mass, of about the consistency of an ointment, varying from white to yellowish or yellow, more or less fluorescent when yellow, especially after being melted; transparent in thin layers, completely amorphous, and without odor or taste, or giving off when heated a faint odor of petroleum. Consisting of hydrocarbons, chiefly of the marsh-gas series ($C_{16}H_{34}$; etc.). Obtained by distilling off the lighter and more volatile portions from American petroleum, and purifying the residue. Melting point about $40^{\circ} C.$ to $45^{\circ} C.$ ($104^{\circ} F.$ to $113^{\circ} F.$).

When petrolatum is prescribed or ordered without further specification, soft petrolatum is to be dispensed.

Petrolatum is known commercially as *cosmoline*, *vaseline*, *petrolina*, *deodorolina*, etc.

PARAFFIN.—The degree of hardness of petrolatum is due to the greater or less proportion of paraffin present. This substance may be obtained in a pure form by distilling the residuum obtained from the refiners of petroleum, and collecting and purifying the distillate. In its pure state it is a white, waxy, inodorous, tasteless substance, harder than tallow, softer than wax. Sp. gr. 0.877; melting point ranges between $43^{\circ} C.$ and $65^{\circ} C.$ ($109^{\circ} F.$ and $151^{\circ} F.$).

PETROLATUM SPISSUM, U. S.—Hard Petrolatum. (*Petrolatum, Pharm. 1880. Hard Petroleum Ointment.*)—A mixture of hydrocarbons, chiefly of the marsh gas series, obtained by distilling off the lighter and more volatile portions from petroleum, and purifying the residue when it has the desired melting point. A fat-like mass, of about the consistence of cerate, varying from white to yellowish or yellow, more or less fluorescent when yellow, especially after being melted; transparent in thin layers, completely amorphous, and without odor or taste, or giving off, when heated, a faint odor of petroleum.

BENZINUM, U. S.—Benzin. (*Petroleum Benzin. Petroleum Ether.*)—A transparent, colorless, diffusive liquid, with a strong, characteristic odor, slightly resembling that of petroleum, but much less disagreeable, neutral reaction. It is a purified distillate from American petroleum, consisting of hydrocarbons, chiefly of the marsh-gas series (C_5H_{12} ; C_6H_{14} , and homologous compounds), having a sp. gr. from 0.670 to 0.675, and boiling at 50° to $60^{\circ} C.$ (122° to $140^{\circ} F.$).

Benzin should be carefully kept in well-stoppered bottles or cans, in a cool place, remote from lights or fire; for it is highly inflammable, and its vapor, when mixed with air and ignited, explodes violently.

DRUGS CONTAINING GLUCOSIDES OR NEUTRAL PRINCIPLES, WITH THEIR PREPARATIONS.

Glucosides are bodies mostly found in plants yielding glucose, $C_6H_{12}O_6$, as one of their products of decomposition when heated in contact with a diluted mineral acid and water. The other product which is formed at the same time differs in character from the original glucoside. Thus, *Salicin*, if boiled with diluted sulphuric acid, yields dextro-glucose and *saligenin*, or *saligenol*.



Glucosides may sometimes be split into glucose and the derived product by heating them with baryta water or alkaline solutions, by nitrogenous principles, which act as ferments, like *emulsin* or *synaptase*, or by treatment with yeast ferment or *ptyalin* found in saliva.

Glucosides are sometimes the active principles of the plants in which they are found, but they are more frequently associated with resins, oils, alkaloids, and bitter principles.—(Remington.)

CONVALLARIA, U. S.—*Convallaria*.—The rhizome and rootlets of *Convallaria majalis*.

Preparation.—*Extractum Convallaria Fluidum*.

GENTIANA, U. S.—*Gentian*.—The root of *Gentiana lutea* contains the glucoside *gentiopicroin* (which splits, when heated with dilute acids, into gentiogenin and grape sugar), *gentisic acid*, $C_{11}H_{10}O_5$, pectin, sugar (gentianose), and a little fixed oil.

Extractum Gentiane Fluidum, U. S.—Fluid Extract of Gentian.

Extractum Gentianæ, U. S.—Extract of Gentian.

Tinctura Gentiane Composita, U. S.—Compound Tincture of Gentian.

CALUMBA, U. S.—*Calumba*. (*Columbo*).—The root of *Jateorhiza calumba* owes its virtues to *colombin*, $C_{21}H_{22}O_7$, and *berberine*, both of which are very bitter; starch and colombic acid are present, with a mucilage which is often troublesome by interfering with percolating operations.

Extractum Calumbæ Fluidum, U. S.—Fluid Extract of Calumba.

Tinctura Calumbæ, U. S.—Tincture of Calumba.

QUASSIA, U. S.—*Quassia*.—The wood of *Picramnia excelsa* contains *quassin*, $C_{10}H_{12}O_3$, which is intensely bitter and soluble in both alcohol and water; there are also present resin, mucilage, etc.

Extractum Quassie Fluidum, U. S.—Fluid Extract of Quassia.

Extractum Quassiae, U. S.—Extract of Quassia.

Tinctura Quassiae, U. S.—Tincture of Quassia.

CHIRATA, U. S.—*Chirata*.—*Ophelia chirata* contains a bitter glucoside, *chiratin*, $C_{26}H_{48}O_{15}$, and a very bitter principle, *ophelic acid*, $C_{13}H_{20}O_{10}$.

Extractum Chiratae Fluidum, U. S.—Fluid Extract of Chirata.

Tinctura Chiratae, U. S.—Tincture of Chirata.

SALIX.—*Salix*. (*Willow*.)—The bark of *Salix alba*, and of other species of *Salix*, owes its bitterness to *salicin*, $C_{13}H_{18}O_7$, a glucoside; it also contains tannin.

SALICINUM, U. S.—*Salicin*. $C_{13}H_{18}O_7$; 286.—Colorless, white, silky, shining crystals, permanent in the air; odorless; very bitter taste; neutral reaction. Prepared by removing gum, tannin, and extractive matter from a boiling concentrated decoction of the bark by treating it with lead oxide, separating the portion of lead oxide dissolved in combination, probably with the salicin, with H_2SO_4 and BaS ; filtering, evaporating, and purifying the deposited salicin by repeated solution and crystallization. Salicin is a glucoside, splitting into saligenin and sugar under the influence of dilute acids and heat.

TARAXACUM, U. S.—*Taraxacum*. (*Dandelion*.)—The root of *Taraxicum dens-leonis*, gathered in autumn, owes its bitterness to *taraxacin*, $C_8H_{10}O$, an acid crystalline principle, soluble in alcohol and water; it also contains pectin, sugar, resin, gum, etc.

Extractum Taraxaci Fluidum, U. S.—Fluid Extract of Taraxacum.

Extractum Taraxaci, U. S.—Extract of Taraxacum.

LAPPA, U. S.—*Lappa*. (*Burdock*.)—The root of *Lappa officinalis* contains a bitter substance, inulin, sugar, mucilage, etc.

SCILLA, U. S.—*Squill*.—The sliced bulb of *Urginea scilla* contains the bitter principle *scillipicrin*, *scillitoxin*, *scillin*, and *scillain*, a poisonous glucoside. There are also present a large quantity of mucilage, calcium oxalate, sinistrin, etc.

Acetum Scillæ, U. S.—Vinegar of Squill.

Extractum Scillæ Finicum, U. S.—Fluid Extract of Squill.

Syrupus Scillæ, U. S.—Syrup of Squill.

Syrupus Scillæ Compositus, U. S.—Compound Syrup of Squill.

Tinctura Scillæ, U. S.—Tincture of Squill.

DIGITALIS, U. S.—*Digitalis*. (*Foxglove*.)—The leaves of *Digitalis purpurea*, collected from plants of the second year's growth.

Digitalis has been the subject of exhaustive investigation. The principle *digitalin* was at one time considered to be an alkaloid. It is, as usually seen, a mixture of *digitoxin* and other neutral principles. *Digitoxin* is converted into *toxiresin* by the action of diluted acids and heat.

Abstractum Digitalis, U. S.—Abstract of *Digitalis*.

Infusum Digitalis, U. S.—Infusion of *Digitalis*.

Extractum Digitalis Fluidum, U. S.—Fluid Extract of *Digitalis*.

Extractum Digitalis, U. S.—Extract of *Digitalis*.

Tinctura Digitalis, U. S.—Tincture of *Digitalis*.

STROPHANTHUS, U. S.—*Strophanthus*.—The seed of *Strophanthus hispidus*, deprived of its long awn, contains a glucoside, *strophanthin*, which yields, on decomposition, glucose and *strophanthidin*.

Tinctura Strophanthi, U. S.—Tincture of *Strophanthus*.

SPIGELIA, U. S.—*Spigelia*. (*Pinkroot*.)—The rhizome and rootlets of *Spigelia marilandica* contain a bitter principle, resin, and a trace of volatile oil, with tannin and wax.

Extractum Spigeliæ Fluidum, U. S.—Fluid Extract of *Spigelia*.

CUSO, U. S.—Kousso. (*Brayera, Pharm. 1880.*)—The female inflorescence of *Hagenia abyssinica* contains a bitter resinous principle, kousin, $C_{31}H_{38}O_{10}$, about 24 per cent. of tannin, gum, sugar, etc.

Extractum Cusso Fluidum, U. S.—Fluid Extract of Cusso.

SANTONICA, U. S.—Santonica. (*Levant Wormseed.*)—The unexpanded flower-heads of *Artemisia maritima*, var. *Stechmanniana*, contain about 2 per cent. of *santonin*, resin, volatile oil, gum, etc.

SANTONINUM, U. S.—Santonin. $C_{15}H_{18}O_3$; 246.—A neutral principle prepared from santonica.

It should be kept in dark, amber-colored vials, and should not be exposed to light.

Description.—Santonin occurs in colorless, shining, flattened, prismatic crystals, not altered by exposure to air, but turning yellow on exposure to light; odorless; nearly tasteless when first placed in the mouth, but afterward bitter; neutral reaction.

Preparation.—Santonin may be made by exhausting santonica mixed with lime with diluted alcohol, distilling off the alcohol and adding acetic acid to the residue. The precipitated santonin is purified by dissolving it in alcohol, treating with animal charcoal, and crystallizing.

PICROTOXINUM, U. S.—Picrotoxin. $C_9H_{10}O_4$; 182.—A neutral principle prepared from the seeds of *Anamirta paniculata*, occurring in the form of colorless, flexible, shining, prismatic crystals, permanent in the air; odorless; very bitter taste; neutral reaction.

Preparation.—Picrotoxin is made from the kernel of *cocculus indicus* by treating an aqueous extract, which has been triturated with magnesia, with hot alcohol; the solution is evaporated, and the crystalline mass purified by recrystallization, after decolorizing with animal charcoal.

ERGOTA, U. S.—Ergot. (*Ergot of Rye.*)—The sclerotium of *Claviceps purpurea*, replacing the grain of *Secale cereale*.

Ergot should be preserved in a dry place, and should not be kept longer than a year.

Ergot owes its activity to *sclerotic acid*, *sclererythrin*, *scleromucin*, *scleriodin*, and *picrosclerotin*; there is also present *scleroxanthin* and *sclerocrystallin*, with 25 per cent. of fixed oil, mycose, and protein compounds.

Extractum Ergote Fluidum, U. S.—Fluid Extract of Ergot.

Extractum Ergote, U. S.—Extract of Ergot.

Vinum Ergote, U. S.—Wine of Ergot.

GOSSYPII RADICIS CORTEX, U. S.—Cotton Root Bark.—The bark of the root of *Gossypium herbaceum* and of other species of *gossypium* contains a yellow resin, which becomes red upon exposure to air, fixed oil, tannin, starch, sugar, etc.

Extractum Gossypii Radicis Fluidum, U. S.—Fluid Extract of Cotton Root.

CROCUS, U. S.—Saffron.—The stigmas of *Crocus sativus* contain *polychroit*, $C_{48}H_{60}O_{18}$, a glucoside, which splits into *crocin* and glucose, volatile oil, wax, fixed oil, protein compounds, sugar, wax, etc.

Tinctura Croci, U. S.—Tincture of Saffron.

SANTALUM RUBRUM, U. S. Red Saunders.—The wood of *Pterocarpus santalinus* contains *santalic acid*, a resinous substance, *ptero-carpin*, and *santol*.

RHUS TOXICODENDRON, U. S.—*Rhus Toxicodendron*. (*Toxicodendron*, Pharm. 1870. *Poison Ivy*.)—The fresh leaves of *Rhus toxicodendron* and *Rhus radicans* contain *toxicodendric acid*, fixed oil, tannin, mucilage, wax, etc.

Drugs Containing Saponified Principles, with their Preparations.

QUILLAJA, U. S.—*Quillaja*. (*Quillaia*, Pharm. 1880. *Soap Bark*).—The bark of *Quillaja Saponaria* owes its action to a peculiar principle, *saponin*, $C_{32}H_{54}O_{18}$, a glucoside, splitting, upon heating with dilute acid, into *sapogenin* and sugar.

SARSAPARILLA, U. S.—*Sarsaparilla*.—The root of *Smilax officinalis*, *Smilax medica*, and of other undetermined species of *Smilax*, contains a glucoside analogous to, if not identical with, saponin, termed *parillin*. When boiled with dilute acids, it splits into *parigenin* and grape sugar.

Decoctum Sarsaparille Compositum, U. S.—Compound Decoction of *Sarsaparilla*.

Extractum Sarsaparille Fluidum, U. S.—Fluid Extract of *Sarsaparilla*.

Extractum Sarsaparille Compositum Fluidum, U. S.—Compound Fluid Extract of *Sarsaparilla*.

Syrupus Sarsaparille Compositus, U. S.—Compound Syrup of *Sarsaparilla*.

SENEGA, U. S.—*Senega*.—The root of *Polygala senega*. *Senega* contains *polygallic acid* (sometimes called *senegin*), fixed oil, pectose, etc. *Polygallic acid* is analogous to, if not identical with, saponin. Liquid preparations of *senega* are very apt to gelatinize, owing to the presence of pectin; this is obviated by using water of ammonia or other alkali, to dissolve it.

Abstractum Senegæ, U. S.—Abstract of *Senega*.

Extractum Senegæ Fluidum, U. S.—Fluid Extract of *Senega*.

Syrupus Senegæ, U. S.—Syrup of *Senega*.

CAULOPHYLLUM, U. S.—*Caulophyllum*. (*Blue Cohosh*).—The rhizome and rootlets of *Caulophyllum thalictroides* contain *saponin*, associated with resin, starch, albumen, coloring matter, extractive, etc.

Drugs Containing Cathartic Principles, and their Preparations.

SENNA, U. S.—*Senna*.—The leaflets of *Cassia acutifolia* (*Alexandria Senna*), and of *Cassia elongata* (*India Senna*), contain cathartic acid, which, under the influence of dilute acids and heat, splits into cathartogenic acid and glucose; there are also present phæoretin, sennocrol, cathartomannit, crysophan, mucilage, etc. Cathartic acid is believed to be the chief purgative principle, although several of the others possess cathartic properties.

Extractum Sennæ Fluidum, U. S.—Fluid Extract of *Senna*.

Infusum Sennæ Compositum, U. S.—Compound Infusion of Senna.

Syrupus Sennæ, U. S.—Syrup of Senna.

Confectio Sennæ, U. S.—Confection of Senna.

TAMARINDUS, U. S.—Tamarind.—The preserved pulp of the fruit of *Tamarindus indica*.

CASSIA FISTULA, U. S.—Cassia Fistula. (*Purging Cassia*).—The fruit of *Cassia fistula* yields about 25 per cent. of pulp, which contains pectin, sugar, albuminous principles, salts, etc.

FICUS, U. S.—Fig.—The fleshy receptacle of *Ficus carica*, bearing fruit upon its inner surface.

PRUNUM, U. S.—Prune.—The fruit of *Prunus domestica* contains sugar, malic acid, pectin, salts, etc.

RHEUM, U. S.—Rhubarb.—The root of *Rheum officinale*, and of other undetermined species of *rheum*. Rhubarb contains four resins, which are cathartic in their properties—*erythroretin*, *phacoretin*, *aporetin*, *emodin*. There are also present chrysophan and chrysophanic acid, both yellow, the former yielding the latter and glucose when treated with diluted acids. The astringent properties of rhubarb are due to *rheotannic acid*, $C_{26}H_{26}O_{14}$; *rheumic acid*, $C_{20}H_{16}O_9$, and calcium oxalate are also present.

Extractum Rhei, U. S.—Extract of Rhubarb.

Extractum Rhei Fluidum, U. S.—Fluid Extract of Rhubarb.

Tinctura Rhei, U. S.—Tincture of Rhubarb.

Tinctura Rhei Aromatica, U. S.—Aromatic Tincture of Rhubarb.

Tinctura Rhei Dulcis, U. S.—Sweet Tincture of Rhubarb.

Syrupus Rhei, U. S.—Syrup of Rhubarb.

Syrupus Rhei Aromaticus, U. S.—Aromatic Syrup of Rhubarb.

Vinum Rhei, U. S.—Wine of Rhubarb.

Mistura Rhei et Sodæ, U. S.—Mixture of Rhubarb and Soda.

Pulvis Rhei Compositus, U. S.—Compound Powder of Rhubarb.

Pilule Rhei, U. S.—Pills of Rhubarb.

Pilule Rhei Composite, U. S.—Compound Pills of Rhubarb.

CHRYSAROBINUM, U. S.—Chrysarobin.—A mixture of proximate principles (commonly misnamed Chrysophanic Acid), extracted from goa powder, a substance found deposited in the wood of the trunk of *Andira araroba*. Chrysarobin is a pale, orange-yellow, crystalline powder, permanent in the air; odorless and tasteless; almost insoluble in water, only slightly soluble in alcohol, readily soluble in ether and boiling benzol.

Unguentum Chrysarobini, U. S.—Chrysarobin Ointment.

KAMALA, U. S.—Kamala. (*Rottlera*, Pharm. 1870.)—The glands and hairs from the capsules of *Mallotus philippinensis* contain *rottlerin*, $C_{22}H_{20}O_6$, nearly 75 per cent. of resins soluble in alcohol, coloring matter, etc.

CAMBOGIA, U. S.—Gamboge. (*Gambogia*, Pharm. 1870.)—A gum-resin obtained from *Garcinia Hanburii*; contains about 75 per cent. of resin called *gambogic acid*.

JALAPA, U. S.—Jalap.—The tuberous root of *Exogonium purga*, contains from 12 to 20 per cent. of resin, the greater part of which is con-

veratulin, $C_{62}H_{100}O_{32}$, a glucoside, insoluble in ether; there are also present gum, sugar, starch, etc.

Abstractum Jalapæ, U. S.—Abstract of Jalap.

Pulvis Jalapæ Compositus, U. S.—Compound Powder of Jalap.

Resinæ Jalapæ, U. S.—Resin of Jalap.

SCAMMONIUM, U. S.—Scammony.—A resinous exudation from the root of *Convolvulus scammonia*; contains from 80 to 90 per cent. of resin having cathartic properties, called *scammonin*, $C_{34}H_{56}O_{16}$; this is identical with the jalapin obtained from *Ipomæa orizabensis*.

Resina Scammonii, U. S.—Resin of Scammony.

PODOPHYLLUM, U. S.—Podophyllum. (*May Apple*).—The rhizome and rootlets of *Podophyllum peltatum* contains *picropodophyllin*, *podophyllotoxin*, and *podophyllinic acid*.

Abstractum Podophylli, U. S.—Abstract of Podophyllum.

Extractum Podophylli, U. S.—Extract of Podophyllum.

Extractum Podophylli Fluidum, U. S.—Fluid Extract of Podophyllum.

Resina Podophylli, U. S.—Resin of Podophyllum.

LEPTANDRA, U. S.—Leptandra. (*Culver's Root*).—The rhizome and rootlets of *Leptandra virginica* contain a crystalline principle, *leptandrin*, resin, tannin, saponin, gum, mannit, etc.

Extractum Leptandræ, U. S.—Extract of Leptandra.

Extractum Leptandræ Fluidum, U. S.—Fluid Extract of Leptandra.

FRANGULA, U. S.—Frangula.—The bark of *Rhamnus frangula*, collected at least one year before being used, contains *frangulin*, $C_{20}H_{20}O_{10}$, sometimes called *rhamnexanthin*, and emodin; both are glucosides.

Extractum Frangulæ Fluidum, U. S.—Fluid Extract of Frangula.

RHAMNUS PURSHIANA, U. S.—Cascara Sagrada.—The bark of *Rhamnus Purshiana* (*Nat. Ord. Rhamnaceæ*).

Preparation.—*Extractum Rhamni Purshianæ Fluidum*.

RUMEX, U. S.—Rumex. (*Yellow Dock*).—The root of *Rumex crispus*, and of other species of *rumex*, contains chrysophanic acid (ruminic acid, lapathin), mucilage, tannin, starch, calcium oxalate, gum, coloring matter, etc.

Extractum Rumicis Fluidum, U. S.—Fluid Extract of Rumex.

JUGLANS, U. S.—Juglans. (*Butternut*).—The inner bark of the root of *Juglans cinerea*, collected in autumn. It contains *nucin*, $C_{36}H_{12}O_{10}$, fixed oil, volatile oil, tannin, etc.

Extractum Juglandis, U. S.—Extract of Juglans.

EUONYMUS, U. S.—Euonymus. (*Wahoo*).—The bark of *Euonymus atropurpureus* contains resins, a bitter principle called *euonymin*, *euonic acid*, starch, asparagin, and pectin.

Extractum Euonymi, U. S.—Extract of Euonymus.

ALOE SOCOTRINA, U. S.—Aloes. (*Aloe Socotrina*, *Pharm.* 1870.)—The inspissated juice of the leaves of *Aloe* contains *aloin*, a trace of volatile oil, and a substance which has been improperly called resin.

The aloin present in officinal aloes is *socaloin*, $C_{15}H_{18}O_7$. This may be distinguished from nataloin and barbaloin by Histed's Test.*

Extractum Aloes Aquosum, U. S.—Aqueous Extract of Aloes.

Aloe Purificata, U. S.—Purified Aloes.

ALOE BARBADENSIS.—Barbadoes Aloes.—The inspissated juice of the leaves of *Aloe vera* (*Nat. Ord. Liliaceæ*). In hard masses, orange-brown, opaque, translucent on the edges; fracture waxy or resinous, somewhat conchoidal; odor, saffron-like; taste, strongly bitter.

ALOINUM, U. S.—Aloin.—A neutral principle obtained from several varieties of aloes, chiefly Barbadoes aloes (yielding Barbaloin); and Socotra or Zanzibar aloes (yielding Socaloin), differing more or less in chemical composition and physical properties according to the source from which it is derived. Minute acicular crystals, or a microcrystalline powder, varying in color from yellow to yellowish-brown, odorless or possessing a slight odor of aloes, of a characteristic, bitter taste, and permanent in the air.

Barbaloin is soluble, at 15° C. (59° F.), in about 60 parts of water, 20 parts of alcohol, or 470 of ether.

Socaloin is soluble in about 60 parts of water, 30 parts of absolute alcohol, 380 parts of ether, or 9 parts of acetic ether.

ALOE PURIFICATA, U. S.—Purified Aloes.—It occurs in irregular, brittle pieces, of a dull brown or reddish-brown color, and having the peculiar odor of Socotrine aloes. It is purified by melting, adding alcohol, to reduce its consistency, and straining off the impurities, sand, earth, chips, etc., evaporating, and, when cool, breaking the brittle mass into pieces of a convenient size.

Tinctura Aloes, U. S.—Tincture of Aloes.

Tinctura Aloes et Myrrhæ, U. S.—Tincture of Aloes and Myrrh.

Vinum Aloes, U. S.—Wine of Aloes.

Pilulæ Aloes, U. S.—Pills of Aloes.

Pilulæ Aloes et Asafetidæ, U. S.—Pills of Aloes and Asafetida.

Pilulæ Aloes et Ferri, U. S.—Pills of Aloes and Iron.

Pilulæ Aloes et Mastiches, U. S.—Pills of Aloes and Mastich.

Pilulæ Aloes et Myrrhæ, U. S.—Pills of Aloes and Myrrh.

COLOCYNTHIS, U. S.—Colocynth.—The fruit of *Citrullus colocynthis*, deprived of its rind, contains *colocynthin*, *colocynthinin*, gum, resin, etc. Colocynthin is a very bitter glucoside, splitting, under the action of diluted acids, into colocynthein and grape sugar.

Extractum Colocynthis, U. S.—Extract of Colocynth.

Extractum Colocynthis Compositum, U. S.—Compound Extract of Colocynth.

ELATERINUM, U. S.—Elaterin. $C_{20}H_{28}O_5$; 348.—Small, colorless, shining, hexagonal scales or prisms, permanent in the air; odorless; having a bitter, somewhat acrid taste, and a neutral reaction. Prepared from elaterium, a sediment deposited by the juice of the fruit of the squaring cucumber, *Echallium elaterium*, by exhausting with alcohol, evapora-

* See Remington's "Practice of Pharmacy."

ting, to the consistency of a thin oil, and throwing the residue, while yet warm, into a weak boiling solution of potassa, by which the green resin is held in solution, and the elaterin crystallizes out when the liquor cools. Or it may be made by exhausting elaterium with chloroform, and precipitating the elaterin from the chloroform solution by ether.

Trituratio Elaterini, U. S.—Trituration of Elaterin.

BRYONIA, U. S.—Bryonia. (*Bryony*).—The root of *Bryonia alba* and of *Bryonia dioica* contains bryonin, a bitter glucoside, soluble in alcohol and in water, starch, sugar, resin, etc.

Tinctura Bryoniæ, U. S.—Tincture of Bryonia.

Drugs Containing Astringent Principles, and their Preparations.

GALLA, U. S.—Nutmall.—Excrecences on *Quercus lusitanica*, var. *infectoria*, caused by the punctures and deposited ova of *Cynips Gallæ tinctoriæ*. Nutmall contains about 50 per cent. of tannin, 2 per cent. of gallic acid, sugar, gum, resin, and starch.

Tinctura Gallæ, U. S.—Tincture of Nutmall.

Unguentum Gallæ, U. S.—Nutmall Ointment.

ACIDUM TANNICUM, U. S.—Tannic Acid. $C_{14}H_{10}O_9$ (chiefly); 322.—Light yellowish scales, permanent in the air; faint, peculiar odor; strongly astringent taste; acid reaction. Prepared by exposing nutmall, in fine powder, to a damp atmosphere for twenty-four hours, making into a paste with ether, setting the paste aside, covered closely, for six hours, then expressing it powerfully between tinned plates, so as to obtain the liquid portion. The resulting cake is again made into a paste with ether and water, and expressed as before, after which the liquids are mixed and evaporated spontaneously to a syrupy consistence, then spread on glass or tin plates, and dried quickly in a drying closet. Water and ether form a soluble compound with the tannic acid, and the expression separates it from the paste, after which the ether and water are driven off by the heat. Tannic acid, chemically, is an anhydride of gallic acid:—



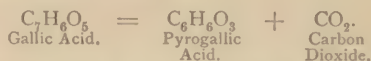
Unguentum Acidi Tannici, U. S.—Ointment of Tannic Acid.

Trochisci, Acidi Tannici, U. S.—Troches of Tannic Acid.

ACIDUM GALLICUM, U. S.—Gallic Acid. $HC_7H_5O_5 \cdot H_2O$; 188.—A nearly or quite colorless solid, crystallizing from water in long, silky needles or triclinic prisms, permanent in the air; odorless; astringent and slightly acidulous taste; acid reaction. Prepared by macerating nutgalls (powdered and made into a paste) with water, for a month, expressing, rejecting the expressed liquor, boiling the residue in water, filtering, while hot, through animal charcoal, and crystallizing. The tannic acid of the galls is converted into gallic acid through the continued maceration with water.



Pyrogallic Acid.—When gallic acid is sublimed, the heat converts it into pyrogallic acid and carbon dioxide:—



Unguentum Acidi Gallici, U. S.—Ointment of Gallic Acid.

PYROGALLOL, U. S.—Pyrogallol. (*Pyrogallic Acid*).—A triatomic phenol obtained chiefly by the dry distillation of gallic acid. Light, white, shining laminae, or fine needles, odorless, and having a bitter taste; acquiring a gray or darker tint on exposure to air and light. Soluble, at 15° C. (59° F.), in 1.7 parts of water, and in 1 part of alcohol; very soluble in boiling water and in boiling alcohol; also soluble in 1.2 parts of ether.

CATECHU, U. S.—Catechu.—An extract prepared from the wood of *Acacia catechu*; contains catechu-tannic acid, a peculiar form of tannin, which is insoluble in ether, and turns greenish-black with ferric salts. *Catechin* and *catechol* are also present. Owing to the decomposition of the tannic acid, the liquid preparations often gelatinize.

Tinctura Catechu Composita, U. S.—Compound Tincture of Catechu.

Trochisci Catechu, U. S.—Troches of Catechu.

KINO, U. S.—Kino.—The inspissated juice of *Pterocarpus marsupium* contains kino-tannic acid, pyrocatechin, kino red, kinoin, gum, etc. Owing to the decomposition of the kino-tannic acid, the liquid preparations frequently gelatinize.

Tinctura Kino, U. S.—Tincture of Kino.

HÆMATOXYLON, U. S.—Hæmatoxyton. (*Logwood*).—The heart-wood of *Hæmatoxyton campechianum* contains a colorless, sweet principle, *hæmatoxylin*, $\text{C}_{16}\text{H}_{14}\text{O}_6$, which is reddened upon exposure to light, and turned blackish purple upon contact with alkalies, yielding *hæmatin*, $\text{C}_{16}\text{H}_{12}\text{O}_6 \cdot \text{H}_2\text{O}$; it also contains tannin, resin, etc.

Extractum Hæmatoxyli, U. S.—Extract of Hæmatoxyton.

KRAMERIA, U. S.—Krameria. (*Rhatany*).—The root of *Krameria triandra*, and of *Krameria tomentosa*, contains about 18 per cent. of kramero-tannic acid, starch, gum, rhatannic red, etc.

Extractum Krameriae, U. S.—Extract of Krameria.

Extractum Krameriae Fluidum, U. S.—Fluid Extract of Krameria.

Tinctura Krameriae, U. S.—Tincture of Krameria.

QUERCUS ALBA, U. S.—White Oak.—The bark of *Quercus alba* contains about 10 per cent. of tannic acid, with pectin, resin, and brownish-red coloring matter.

ROSA GALLICA, U. S.—Red Rose.—The petals of *Rosa gallica*, collected before expanding. It contains *quercitrin* and *quercitannic acid*; the pale red coloring matter is made bright red by the addition of sulphuric acid.

Extractum Rosæ Fluidum, U. S.—Fluid Extract of Rose.

Mel Rosæ, U. S.—Honey of Rose.

Confectio Rosæ, U. S.—Confection of Rose.

ROSA CENTIFOLIA, U. S.—Pale Rose.—The petals of *Rosa centifolia* contain a little tannin, volatile oil, sugar, mucilage, etc.

Aqua Rosæ, U. S.—Rose water.

OLEUM ROSÆ, U. S.—Oil of Rose.—A volatile oil distilled from the fresh flowers of *Rosa damascena*. It is a pale-yellowish, transparent liquid, having a strong odor of rose; a sweetish, rather mild taste, and a slightly acid reaction; sp. gr. about 0.860.

RHUS GLABRA, U. S.—Rhus Glabra.—The fruit of *Rhus Glabra*.

RUBUS, U. S.—Rubra. (*Blackberry*.)—The bark of the root of *Rubus villosus*, *Rubus canadensis*, and *Rubus trivialis*, owes its astringent properties to tannic acid.

Extractum Rubi Fluidum, U. S.—Fluid Extract of Rubus.

GERANIUM, U. S.—Geranium. (*Cranesbill*.)—The rhizome of *Geranium maculatum* contains about 15 per cent. of tannic acid, with brownish-red coloring matter, starch, sugar, pectin, etc.

Extractum Geranii Fluidum, U. S.—Fluid Extract of Geranium.

HAMAMELIS, U. S.—Hamamelis. (*Witchhazel*.)—The leaves of *Hamamelis virginica*, collected in autumn, contain tannic acid, chlorophyll, bitter principle, mucilage, etc.

Extractum Hamamelidis Fluidum, U. S.—Fluid Extract of Hamamelis.

CHIMAPHILA, U. S.—Chimaphila. (*Pipsissewa*.)—The leaves of *Chimaphila umbellata* contain about 5 per cent. of tannic acid, with chimaphilin, ericolin, arbutin, urson, sugar, gum, etc.

Extractum Chimaphila Fluidum, U. S.—Fluid Extract of Chimaphila.

UVA URSI, U. S.—Uva Ursi. (*Bearberry*.)—The leaves of *Arctostaphylos uva ursi* contain about 6 per cent. of tannic acid, with gallic acid, urson, arbutin, ericolin, gum, resin, coloring matter, etc.

Extractum Uve Ursi Fluidum, U. S.—Fluid Extract of Uva Ursi.

CASTANEA, U. S.—Castanea. (*Chestnut*.)—The leaves of *Castanea vesca*, collected in September or October, while still green. Chestnut leaves contain tannic acid, mucilage, etc.

Extractum Castaneæ Fluidum, U. S.—Fluid Extract of Castanea.

SALVIA, U. S.—Salvia. (*Sage*.)—The leaves of *Salvia officinalis*.

ALKALOIDS.

Into what two General Divisions are Alkaloids Divided Chemically? AMIDES—Composed of C H N and O; AMINES—Composed of C H and N (oxygen wanting).

What is the Source of Alkaloids? They are found in both the animal and vegetable kingdoms.

What are their Distinctive Features? First, they all contain N. The non-volatile alkaloids (amides) are solid; the volatile alkaloids (amines) are liquid. Second, they restore the color of reddened litmus, combine with acids to form salts, and are precipitated from their saline solutions by alkalis. Third, they are generally the active principles of the plants

in which they reside, are mostly poisonous, and have a bitter, acrid, or pungent taste. Fourth, they are mostly crystallizable and colorless, insoluble in H_2O , soluble in alcohol, chloroform, benzin, benzol, and some in ether. Their salts, however, are mostly soluble in H_2O , less so in alcohol; insoluble in chloroform, ether, benzin, and benzol. Fifth, they are mostly precipitated by one or more of the following reagents: *Potassium mercuric iodide, auric chloride, tannic acid, phospho-molybdic acid, and picric acid.*

What Nomenclature has been adopted for the Alkaloids? The last syllable should terminate in *ine*: the Latin termination is *ina*: the names of neutral principles and glucosides end in *in*.

OPIUM, U. S.—Opium.—The concrete, milky exudation obtained in Asia Minor by incising the unripe capsules of *Papaver somniferum*, containing, in its normal moist condition, not less than 9 per cent. of morphine when assayed; and when in dry powder, not less than 12 nor more than 16 per cent. of morphine.

What two Acids are found in Opium combined with the Alkaloids? Meconic and lactic acids.

How many Alkaloids does Opium contain? Nineteen, of which the most important is morphine.

OPII PULVIS, U. S.—Powdered Opium.—Opium dried at a temperature not exceeding $85^{\circ} C.$ ($185^{\circ} F.$), and reduced to a very fine (No. 80) powder. Should yield not less than 13 nor more than 15 per cent. of crystallized morphine.

Preparations.—Acetum Opii, Extractum Opii, Opium Deodoratum, Pilulæ Opii, Pulvis Ipecacuanhæ et Opii, Tinctura Opii, Tinctura Opii Camphorata, Tinctura Opii Deodorati, Trochisci Glycyrrhizæ et Opii, Vinum Opii.

OPIUM DEODORATUM, U. S.—Deodorized Opium. (*Opium Denarotissatum, Pharm. 1880.*)—Opium from which the narcotine has been extracted with stronger ether, and mixing it with sugar of milk, and containing 14 per cent. of morphine.

Extractum Opii, U. S.—Extract of Opium.

Pulvis Opii, U. S.—Powdered Opium. In No. 50 powder, 8 grains represent about 10 grains of opium.

Tinctura Opii, U. S.—Tincture of Opium.

Tinctura Opii Deodorata, U. S.—Deodorized Tincture of Opium. Made by separating out the narcotine and odorous principles with ether.

Acetum Opii, U. S.—Vinegar of Opium.

Tinctura Opii Camphorata, U. S.—Camphorated Tincture of Opium (Paregoric).

Vinum Opii, U. S.—Wine of Opium.

Pilulæ Opii, U. S.—Pills of Opium.

Pulvis Ipecacuanhæ et Opii, U. S.—Powder of Ipecac and Opium.

Emplastrum Opii, U. S.—Opium Plaster.

Trochisci Glycyrrhizæ et Opii, U. S.—Troches of Glycyrrhiza and Opium

MORPHINA, U. S.—Morphine. $C_{17}H_{19}NO_3 \cdot 11_2O$.—Colorless or white, shining, prismatic crystals, or a crystalline powder, permanent in the air; odorless; bitter taste; alkaline reaction. Prepared from an

aqueous solution of opium containing the alkaloid in combination with meconic and lactic acids, by treating it with alcohol and water of ammonia—the former retaining the coloring matter, caoutchouc, resins, etc., in solution, while the latter sets free the morphine, by combining with the natural acids. The alkaloid is then purified by dissolving in boiling alcohol, filtering through animal charcoal, and crystallizing.

MORPHINÆ ACETAS, U. S.—Morphine Acetate. (*Morphiæ Acetis*, *Pharm.* 1870.) $C_{17}H_{19}NO_3.HC_2H_3O_2.3H_2O$; 399.—A white or yellowish-white crystalline or amorphous powder, slowly losing acetic acid when kept for some time and exposed to the air; having a faintly acetous odor, a bitter taste, and a neutral or faintly alkaline reaction. Prepared by acting on morphine with acetic acid.

MORPHINÆ HYDROCHLORAS, U. S.—Morphine Hydrochlorate. $C_{17}H_{19}NO_3.HCl.3H_2O$; 375.4.—White, feathery, flexible, acicular crystals, of a silky lustre, permanent in the air; odorless; bitter taste; neutral reaction. Made by acting on morphine with hydrochloric acid.

MORPHINÆ SULPHAS, U. S.—Morphine Sulphate. ($C_{17}H_{19}NO_3$)₂. $H_2SO_4.5H_2O$; 758.—White, feathery, acicular crystals, of a silky lustre, permanent in the air; odorless; bitter taste; neutral reaction. Prepared by acting on morphine with sulphuric acid.

Pulvis Morphine Compositus, U. S.—Compound Morphine Powder.

Trochisci Morphine et Ipecacuanhe, U. S.—Troches of Morphine and Ipecac.

CODEINA, U. S.—Codeine. (*Codeia*.) $C_{18}H_{21}NO_3.H_2O$; 317.—An alkaloid prepared from opium, occurring in the form of white or yellowish-white, more or less translucent, rhombic prisms, somewhat efflorescent in warm air; odorless; slightly bitter taste; alkaline reaction. Prepared by precipitating the hydrochlorates of morphine and codeine with ammonia, codeine remaining in solution, and afterward obtained by evaporation, crystallization, and purifying by dissolving in hot ether, and evaporating spontaneously.

APOMORPHINÆ HYDROCHLORAS, U. S.—Apomorphine Hydrochlorate. $C_{17}H_{17}NO_2.HCl$; 303.4.—A salt of an alkaloid of opium, occurring in the form of minute, colorless, or grayish white, shining crystals, turning greenish on exposure to light and air; odorless; bitter taste; neutral or faintly acid reaction. Prepared by heating morphine in a closed tube, with a great excess of hydrochloric acid, for two or three hours, to the temperature of 140° – 150° C. (284° – 302° F.), dissolving the contents of the tube in water, adding an excess of $NaHCO_3$, and exhausting the precipitate with ether or chloroform; the addition of HCl now results in crystals of the salt. The rationale of the process is one of dehydration; the morphine parts with one molecule of water.

CINCHONA, U. S.—Cinchona.—The bark of *Cinchona Calisaya*, *Cinchona officinalis*, and of hybrids of these and of other species of *Cinchona*, yielding, when assayed by the U. S. P. process, not less than 5 per cent. of total alkaloids, and at least 2.5 per cent. of quinine ($C_{20}H_{24}N_2O_2 + H_2O = 341.3$).

CINCHONA RUBRA, U. S.—Red Cinchona. (*Red Bark*).—The bark of the trunk of *Cinchona succirubra*, containing at least 2 per cent. of quinine.

Cinchona barks are assayed, first, for total alkaloids; second, for quinine, by a process directed in the U. S. P. (which see). About twenty alkaloids have been discovered in cinchona bark. Some of these are found only in one kind of bark; some are, doubtless, "split products" (alkaloids not existing naturally in the bark, but the result of the action of chemical agents upon it). The most important alkaloids found in cinchona are *quinine*, *quinidine*, *cinchonine*, and *cinchonidine*. The acids present are *kinic* or *quinic*, *cinchotannic*, and *kinovic* or *quinovic*. The neutral principle is *kinovin* or *quinovin*; *cinchonic red*, volatile oil, and red and yellow coloring matters are also present.

Extractum Cinchonæ, U. S.—Extract of Cinchona.

Extractum Cinchonæ Fluidum, U. S.—Fluid Extract of Cinchona.

Tinctura Cinchonæ, U. S.—Tincture of Cinchona.

Tinctura Cinchonæ Composite, U. S.—Compound Tincture of Cinchona.

QUININA, U. S.—Quinine. $C_{20}H_{24}N_2O_2 \cdot 3H_2O$ (crystallized); 378.—Quinine is an alkaloid from cinchona, occurring in the form of a white, flaky, amorphous, or minutely crystalline powder, permanent in the air. It is odorless, has a very bitter taste and alkaline reaction. Prepared by adding to the acid solution of the sulphate ammonia water or solution of soda, which precipitates the alkaloid. As quinine is soluble in alkalies, carefully avoid excess.

QUININÆ SULPHAS, U. S.—Quinine Sulphate. (*Quinine Sulphas, Pharm.* 1870.) $(C_{20}H_{24}N_2O_2)_2H_2SO_4 \cdot 7H_2O$; 872.—Snow-white, loose, filiform crystals, fragile and somewhat flexible, making a very light and easily compressible mass; lustreless, from superficial efflorescence, after standing in the air, and losing most of its water of crystallization on long exposure; odorless; persistent, very bitter taste; neutral reaction. Prepared by treating yellow cinchona bark with hydrochloric acid, which forms, with the alkaloids, soluble hydrochlorates; decomposing with lime, which precipitates the alkaloid; dissolving out the alkaloid from the excess of lime with boiling alcohol; evaporating; acidulating with sulphuric acid, which forms the sulphate, then purifying with the animal charcoal, and crystallizing.

QUININÆ BISULPHAS, U. S.—Quinine Bisulphate. $C_{20}H_{24}N_2O_2 \cdot H_2SO_4 \cdot 7H_2O$; 548.—Clear, colorless, orthorhombic crystals or small needles, efflorescing and becoming opaque on exposure to air; odorless; very bitter taste; strongly acid reaction. Prepared by acting on quinine sulphate by sulphuric acid. The bisulphate of quinine contains 13 per cent. less alkaloid than the sulphate.

QUININÆ HYDROCHLORAS, U. S.—Quinine Hydrochlorate. $C_{20}H_{24}N_2O_2 \cdot HCl \cdot 2H_2O$; 396.4.—White, lustrous needles forming tufts, permanent in ordinary air, but readily efflorescing at a gentle heat; odorless, very bitter taste; neutral or faintly alkaline reaction. Prepared by double decomposition between quinine sulphate and barium chloride, or by dissolving the alkaloid in dilute HCl, evaporating, and crystallizing.

QUININÆ HYDROBROMAS, U. S.—Quinine Hydrobromate. $C_{20}H_{24}N_2O_4 \cdot HBr \cdot 2H_2O$; 440.8.—Colorless, lustrous needles, permanent in ordinary air, but readily efflorescing at a gentle heat; odorless; very bitter taste; neutral or slightly alkaline reaction. Prepared by decomposing quinine sulphate in alcohol, with potassium bromide, in water. K_2SO_4 crystallizes out, and the hydrobromate may be obtained by evaporating and crystallizing. Quinine hydrobromate may also be made by double decomposition between quinine sulphate and barium bromide, or by dissolving the alkaloids in hot dilute HBr.

QUININÆ VALERIANAS, U. S.—Quinine Valerianate. $C_{20}H_{24}N_2O_2 \cdot C_5H_{10}O_2 \cdot H_2O$; 444.—White or nearly white, pearly, lustrous, triclinic crystals, permanent in the air and slightly soluble in ether; slight odor of valerianic acid; bitter taste; neutral reaction. Prepared by decomposing the sulphate by AmHO, and combining it with valerianic acid. (Hot solutions are used and the valerianate crystallizes on cooling.)

QUINIDINÆ SULPHAS, U. S.—Quinidine Sulphate. $(C_{20}H_{24}N_2O_2)_2H_2SO_4 \cdot 2H_2O$; 782.—A salt of an alkaloid of cinchona, obtained from the mother-liquors obtained after the crystallization of quinine, occurring in the form of white, silky needles, permanent in the air; odorless; very bitter taste; neutral or faintly alkaline reaction, and differing from quinine in being dextrogyre (quinine is lævogyre) and being almost insoluble in ether.

CINCHONINA, U. S.—Cinchonine. (*Cinchonia*.) $C_{20}H_{24}N_2O$; 308.—An alkaloid of cinchona, which may be obtained from the mother-waters of quinine sulphate by diluting them with water, precipitating with AmHO, washing and drying, and then dissolving in boiling alcohol, which deposits the cinchonine in a crystalline form upon cooling. It may be purified still further by re crystallization. It occurs in the form of white, somewhat lustrous prisms or needles, permanent in the air; odorless; at first nearly tasteless, but developing a bitter after-taste; alkaline reaction.

CINCHONINÆ SULPHAS, U. S.—Cinchonine Sulphate. (*Cinchonic*, *Pharm.* 1870.) $(C_{20}H_{24}N_2O)_2H_2SO_4 \cdot 2H_2O$; 750.—Hard, white, shining prisms of the clinorhombic system, permanent in the air; odorless; very bitter taste; neutral or faintly alkaline reaction. Prepared from quinine mother-liquors by precipitating with soda, and converting into a sulphate by H_2SO_4 , decolorizing and crystallizing.

CINCHONIDINÆ SULPHAS, U. S.—Cinchonidine Sulphate. $(C_{20}H_{24}N_2O)_2H_2SO_4 \cdot 3H_2O$; 768.—A salt of an alkaloid of cinchona, obtained from quinine mother-liquors by a fractional crystallization, and occurring in the form of white, silky, lustrous needles, or thin, quadratic prisms; odorless; very bitter taste; neutral or faintly alkaline reaction.

NUX VOMICA, U. S.—Nux Vomica.—The seed of *Strychnos nuxvomica*. It contains strychnine, brucine ($C_{23}H_{26}N_2O_4$), probably igasurine, igasuric acid, protein compounds, gum, fixed oil, sugar, etc. It owes its activity principally to strychnine. Its official preparations are:—

Extractum Nucis Vomice Fluidum, U. S.—Fluid Extract of Nux Vomica.

Tinctura Nucis Vomice, U. S.—Tincture of Nux Vomica.

IGNATIA.—*Ignatia*. (*Bean of St. Ignatius*).—The seed of *Strychnos Ignatii*. It contains strychnine and brucine combined with igasuric acid, gum, resin, extractive, fixed oil, bassorin, etc. Its activity is principally due to strychnine, of which it yields a larger proportion than *Nux Vomica*.

STRYCHNINA, U. S.—Strychnine. $C_{21}H_{22}N_2O_2$; 334.—An alkaloid prepared from *nux vomica* or *ignatia*, and also occurring in other plants of the natural order *Loganiaceæ*, occurring in the form of colorless, octahedral or prismatic crystals, or a white, crystalline powder, permanent in the air; odorless; intensely bitter taste, which is still perceptible in a highly dilute (one in 700,000) solution; alkaline reaction. Prepared by treating *nux vomica* with hydrochloric acid, decomposing by lime, dissolving out from the excess of lime with boiling alcohol (the brucine having been previously removed by treatment with diluted alcohol), evaporating the alcoholic solution, acidulating with H_2SO_4 , to form a sulphate, decolorizing and crystallizing, then dissolving the crystals and precipitating the alkaloid by $AmHO$.

STRYCHNINÆ SULPHAS, U. S.—Strychnine Sulphate. (*Strychnine Sulphas, Pharm. 1870.*) $(C_{21}H_{22}N_2O_2)_2 \cdot H_2SO_4 \cdot 7H_2O$; 892.—Colorless or white, shining, prismatic crystals, efflorescent in dry air; odorless; intensely bitter taste, which is still perceptible in a highly dilute (one in 700,000) solution; neutral reaction. Prepared during the process for making strychnine, and much more soluble than the latter.

COCA, U. S.—Coca. (*Erythroxylon, Pharm. 1880.*)—The leaves of *Erythroxylon Coca*.

Preparation.—*Extractum Cocæ Fluidum*.

COCAINÆ HYDROCHLORAS, U. S.—Cocaine Hydrochlorate. $C_{17}H_{21}NO_4 \cdot HCl = 338.71$.—This hydrochloride is an alkaloid obtained from coca.

GELSEMIUM, U. S.—Gelsemium. (*Yellow Jasmine*).—The rhizome and rootlets of *Gelsemium sempervirens* contains gelsemine, $C_{11}H_{12}NO_2$, gelseminic acid, volatile oil, starch, resin, fat, coloring matter, etc.

Extractum Gelsemii Fluidum, U. S.—Fluid Extract of Gelsemium.

Tinctura Gelsemii, U. S.—Tincture of Gelsemium.

PHYSOSTIGMA, U. S.—Physostigma. (*Calabar Bean*).—The seed of *Physostigma venenosum*, containing physostigmine or eserine, $C_{15}H_{21}N_3O_2$, an alkaloid, amorphous and without taste; also calabarine, an alkaloid derived from eserine; and a neutral principle, *physosterin*; also starch, protein compounds, mucilage, etc.

Extractum Physostigmatis, U. S.—Extract of Physostigma.

Tinctura Physostigmatis, U. S.—Tincture of Physostigma.

PHYSOSTIGMINÆ SALICYLAS, U. S.—Physostigmine Salicylate. $C_{15}H_{21}N_3O_2 \cdot C_7H_6O_3$; 413.—Colorless, shining, acicular, or short columnar crystals, gradually turning red when long exposed to air and light; odorless; bitter taste; neutral reaction. Prepared by adding 2 p. of physostigmine to a solution of 1 p. of salicylic acid in 35 p. boiling distilled water, and allowing the salt to crystallize on cooling.

PHYSOSTIGMINÆ SULPHAS, U. S.—Physostigmine Sulphate. $(C_{15}H_{21}N_3O_2)_2H_2SO_4 = 646.82$. (*Eserine Sulphate*.)—The sulphate of an alkaloid obtained from Physostigma. A white or yellowish-white, micro-crystalline powder, odorless, and having a bitter taste.

BELLADONNÆ FOLIA, U. S.—Belladonna Leaves.—The leaves of *Atropa Belladonna*.

BELLADONNÆ RADIX, U. S.—Belladonna Root.—The root of *Atropa Belladonna*. Belladonna owes its activity to *atropine*, $C_{17}H_{23}NO_3$, and a small quantity of *hyoscyamine*; it also contains *belladonnine*. Official preparations of the leaves:—

Extractum Belladonnæ Alcoholicum, U. S.—Alcoholic Extract of Belladonna.

Tinctura Belladonnæ, U. S.—Tincture of Belladonna.

Unguentum Belladonnæ, U. S.—Belladonna Ointment.

Of the root:—

Abstractum Belladonnæ, U. S.—Abstract of Belladonna.

Extractum Belladonnæ Fluidum, U. S.—Fluid Extract of Belladonna.

Emplastrum Belladonnæ, U. S.—Belladonna Plaster.

Linimentum Belladonnæ, U. S.—Belladonna Liniment.

ATROPINA, U. S.—Atropine. (*Atropia, Pharm. 1870.*) $C_{17}H_{23}NO_3$; 289.—Colorless or white acicular crystals, permanent in the air; odorless; bitter and acid taste; alkaline reaction. Prepared by treating a concentrated alcoholic tincture of the root with H_2SO_4 , to convert the atropine into sulphate, distilling off the alcohol, adding water to the residuary liquid, filtering, to separate oil and resin, treating the filtrate with potassium hydrate and chloroform—the former to decompose the sulphate and evaporating the latter to obtain the alkaloid.

ATROPINÆ SULPHAS, U. S.—Atropine Sulphate. $(C_{17}H_{23}NO_3)_2H_2SO_4$; 676.—A white, indistinctly crystalline powder, permanent in the air; odorless; very bitter, nauseating taste; neutral reaction. Prepared by treating the alkaloid with dilute sulphuric acid, and evaporating at a temperature not exceeding $37.7^\circ C.$ ($100^\circ F.$)

HYOSCYAMUS, U. S.—Hyoscyamus. (*Hyoscyami Folia, Pharm. 1870. Henbane.*)—The leaves of *Hyoscyamus nigra*, collected from plants of the second year's growth and containing hyoscyamine, $C_{17}H_{23}NO_3$; hyoscyne, $C_{17}H_{23}NO_3$; hyoscyperin, $C_{27}H_{52}O_{14}$; chlorophyl, mucilage, extractive matter, etc.

Abstractum Hyoscyami, U. S.—Abstract of Hyoscyamus.

Extractum Hyoscyami Alcoholicum, U. S.—Alcoholic Extract of Hyoscyamus.

Extractum Hyoscyami Fluidum, U. S.—Fluid Extract of Hyoscyamus.

Tinctura Hyoscyami, U. S.—Tincture of Hyoscyamus.

HYOSCINÆ HYDROBROMAS, U. S.—Hyoscyne Hydrobromate. $C_{17}H_{21}NO_4HBr + 3H_2O = 436.98$.—The hydrobromate of an alkaloid obtained from Hyoscyamus; occurring in colorless, transparent, rhombic crystals; odorless, and having an acid, slightly bitter taste; permanent in the air; soluble at $15^\circ C.$ ($59^\circ F.$) in 1.9 p. of water, and in 13

p. alcohol; very slightly soluble in ether and chloroform. It should be kept in small, well-stoppered vials.

HYOSCYAMINÆ HYDROBROMAS, U. S.—Hyoscyamine Hydrobromate. $C_{17}H_{23}NO_3 \cdot HBr$; 369.14.—The hydrobromate of an alkaloid obtained from *Hyoscyamus*; occurring as a yellowish-white, amorphous, resin-like mass, or prismatic crystals, having—particularly when damp—a tobacco-like odor, and an acrid, nauseous, and bitter taste; deliquescent on exposure to air. Soluble at $15^\circ C.$ ($59^\circ F.$) in about 0.3 p. of water, 2 p. alcohol, 3000 p. of ether, or 250 p. of chloroform.

HYOSCYAMINÆ SULPHAS, U. S.—Hyoscyamine Sulphate. $C_{17}H_{23}NO_3 \cdot \frac{1}{2} H_2SO_4$; 676.—Small, golden-yellow or yellowish-white scales or crystals, or a yellowish-white amorphous powder, deliquescent on exposure to air; odorless, having a bitter and acrid taste, and a neutral reaction. Prepared by heating an acidulated tincture of the seeds, after separating the fixed oil, with soda, precipitating with tannin, mixing the precipitate with lime, exhausting with alcohol, acidulating, concentrating, agitating with ether, to remove coloring matter and oil, afterward decolorizing and recrystallizing.

SPARTEINÆ SULPHAS, U. S.—Sparteina Sulphate. $C_{15}H_{26}N_2H_2SO_4 + 4H_2O$; 403.23.—The neutral sulphate of an alkaloid obtained from *scoparius*; colorless, white, prismatic crystals, or a granular powder; odorless, and having a slightly saline and somewhat bitter taste. Liable to attract moisture when exposed to damp air. Very soluble in water and alcohol.

STRAMONII FOLIA, U. S.—Stramonium Leaves.—The leaves of *Datura stramonium*.

STRAMONII SEMEN, U. S.—Stramonium Seed.—The seed of *Datura stramonium*. Stramonium contains *daturine* (a mixture of hyoscyamine and atropine); the leaves also contain albumen, mucilage, and potassium nitrate, while in the seeds exist about 25 per cent. of fixed oil, with resin, mucilage, etc.

Extractum Stramonii, U. S.—Extract of Stramonium.

Extractum Stramonii Fluidum, U. S.—Fluid Extract of Stramonium.

Tinctura Stramonii, U. S.—Tincture of Stramonium.

Unguentum Stramonii, U. S.—Stramonium Ointment.

DULCAMARA, U. S.—Dulcamara. (*Bittersweet*).—The young branches of *Solanum dulcamara*, containing solanine (alkaloid) and *dulcamarine*, $C_{22}H_{34}O_{10}$ (glucoside), (the latter is the bitter and sweet principle), gum, wax, fat, resin, etc.

Extractum Dulcamara Fluidum, U. S.—Fluid Extract of Dulcamara.

PILOCARPUS, U. S.—Pilocarpus. (*Jaborandi*).—The leaflets of *Pilocarpus pennatifolius*, containing *pilocarpine*, $C_{11}H_{16}N_2O_2$, and volatile oil, consisting principally of *pilocarpene*, $C_{10}H_{16}$, a terpene.

Extractum Pilocarpi Fluidum, U. S.—Fluid Extract of Pilocarpus.

PILOCARPINÆ HYDROCHLORAS, U. S.—Pilocarpine Hydrochlorate. $C_{11}H_{16}N_2O_2 \cdot HCl$; 244.4.—Minute, white crystals, deliquescent; odorless; faintly bitter taste; neutral reaction. Prepared by treating pilocarpine with dilute HCl , concentrating, and crystallizing.

COLCHICI RADIX, U. S.—*Colchicum Root*.—The corm of *Colchicum autumnale*.

COLCHICI SEMEN, U. S.—*Colchicum Seed*.—The seed of *Colchicum autumnale*. *Colchicum* contains the alkaloid *colchicine*, both in corm and seed. In the former there are present starch, gum, fat, sugar, resin, etc. In the latter a fixed oil is found in addition to the other principles. The alkaloid may be extracted by digesting the seeds in hot alcohol without powdering them.

Extractum Colchici Radicis, U. S.—Extract of *Colchicum Root*.

Extractum Colchici Radicis Fluidum, U. S.—Fluid Extract of *Colchicum Root*.

Vinum Colchici Radicis, U. S.—Wine of *Colchicum Root*.

Extractum Colchici Seminis Fluidum, U. S.—Fluid Extract of *Colchicum Seed*.

Tinctura Colchici, U. S.—Tincture of *Colchicum (seed)*.

Vinum Colchici Seminis, U. S.—Wine of *Colchicum Seed*.

VERATRUM VIRIDE, U. S.—*Veratrum Viride*. (*American hellebore*.)—The rhizome and rootlets of *Veratrum viride*, containing the alkaloids *jervine*, *veratroidine*, *pseudojervine*, and *rubijervine*, also resins, starch, coloring matter, etc.

Extractum Veratri Viridis Fluidum, U. S.—Fluid Extract of *Veratrum Viride*.

Tinctura Veratri Viridis, U. S.—Tincture of *Veratrum Viride*.

VERATRINA, U. S.—*Veratrine*.—An alkaloid or mixture of alkaloids, prepared from the seeds of *Asagrea officinalis*, occurring in the form of a white or grayish-white, amorphous, rarely crystalline powder, permanent in the air; odorless; of a distinctive acrid taste, leaving a sensation of tingling and numbness on the tongue, producing constriction of the fauces, and highly irritant to the nostrils. Prepared by exhausting the seeds with alcohol, recovering the alcohol by distillation, diluting the residuary liquid, which contains veratrine in its natural combination with veratric acid, with water, to precipitate the resins, filtering, adding potassa or ammonia to precipitate the alkaloid, redissolving, decolorizing, and reprecipitating.

Oleatum Veratrinae, U. S.—Oleate of *Veratrine*.

Unguentum Veratrinae, U. S.—Ointment of *Veratrine*.

CHELIDONIUM, U. S.—*Chelidonium*. (*Celandine*.)—*Chelidonium majus* contains *cheerythrine*, *chelidonine*, $C_{19}H_{17}N_3O_3$, *chelidoxanthin*, and *chelidonic acid*.

SANGUINARIA, U. S.—*Sanguinaria*. (*Bloodroot*.)—The rhizome of *Sanguinaria canadensis*, collected in autumn and containing *sanguinarine*, $C_{19}H_{17}NO_4$; a colorless alkaloid, which yields bright red salts; another unnamed alkaloid; also malic and citric acid, starch, resins, coloring-matter, etc.

Acetum Sanguinarie, U. S.—Vinegar of *Sanguinaria*.

Extractum Sanguinarie Fluidum, U. S.—Fluid Extract of *Sanguinaria*.

Tinctura Sanguinarie, U. S.—Tincture of *Sanguinaria*.

STAPHISAGRIA, U. S.—*Staphisagria*. (*Stavesacre*.)—The seed of *Dolichium staphisagria*, containing three alkaloids, *delphinine*, *delphi-*

sine, and delphinoidine, also, *staphisain*, with fixed oil, protein compounds etc.

ACONITUM, U. S.—**Aconite.**—The tuberous root of *Aconitum napellus*, containing *aconitine*, $C_{33}H_{43}NO_{12}$; *pseudoaconitine*, $C_{36}H_{49}N_{11}$; *picroaconitine*, $C_{31}H_{45}NO_{11}$; *aconine*, $C_{26}H_{38}NO_{11}$; *pseudoaconine*, $C_{27}H_{41}NO_8$; *aconitic acid*, $H_3C_6H_3O_6$; together with resin, sugar, fat, coloring matter, etc. *Aconitic acid* may be produced by heating citric acid to $155^{\circ}C.$ ($311^{\circ}F.$).

Abstractum Aconiti, U. S.—Abstract of Aconite.

Extractum Aconiti, U. S.—Extractum of Aconite.

Extractum Aconiti Fluidum, U. S.—Fluid Extract of Aconite.

Tinctura Aconiti, U. S.—Tincture of Aconite.

Tartaric acid is used with the alcohol in extracting aconite, to aid in abstracting the aconitine, although its use is unnecessary.

HYDRASTIS, U. S.—**Hydrastis.** (*Golden Seal*).—The rhizome and rootlets of *Hydrastis canadensis*, containing *hydrastine*, $C_{22}H_{23}NO_6$; *berberine*, $C_{20}H_{17}NO_4$; *xanthopuccine*, sugar, starch, resin, coloring-matter, etc.

Extractum Hydrastis Fluidum, U. S.—Fluid Extract of Hydrastis.

Tinctura Hydrastis, U. S.—Tincture of Hydrastis.

HYDRASTININÆ HYDROCHLORAS, U. S.—**Hydrastinine Hydrochlorate.** $C_{11}H_{11}NO_2HCl = 224.97$ —The hydrochlorate of an artificial alkaloid derived from hydrastine, the latter being a colorless alkaloid obtained from hydrastis. Light-yellow, amorphous granules, or a pale-yellow, crystalline powder; odorless, and having a bitter, saline taste; deliquescent on exposure to damp air; soluble at $15^{\circ}C.$ ($59^{\circ}F.$) in 0.3 part of water and in three parts of alcohol; difficultly soluble in ether or chloroform. Keep in well-stoppered vials.

MENISPERMUM, U. S.—**Menispermum.** (*Canadian Moonseed*).—The rhizome and rootlets of *Menispermum canadense*, containing *menispermine*, *berberine*, resin, starch, tannin, coloring matter, etc.

GRANATUM, U. S.—**Pomegranate.**—The bark of the root of *Punica granatum*, containing four alkaloids: *pelletierine*, *isopelletierine*, *methylpelletierine*, *pseudopelletierine*. The first three are liquid, the latter solid and crystalline. The drug also contains punico-tannic acid, $C_{20}H_{16}O_{13}$, sugar, mannit, pectin, gum, etc.

PAREIRA, U. S.—**Pareira.** (*Pareira Brava*).—The root of *Chonodendron tomentosum*, containing *pelosine* or *cissampeline*, which is identical with buxine and berberine, alkaloids obtained from *buxus semper virens* and *nectandra rodiaei*.

Extractum Pareiræ Fluidum, U. S.—Fluid Extract of Pareira.

IPECACUANHA, U. S.—**Ipecac.**—The root of *Cephaelis Ipecacuanha*, containing emetine, $C_{28}H_{40}N_2O_5$, ipecacuanhic acid, pectin, starch, resin, sugar, etc.

Extractum Ipecacuanhæ Fluidum, U. S.—Fluid Extract of Ipecac.

Trochisci Ipecacuanhæ, U. S.—Troches of Ipecac.

Syrupus Ipecacuanhæ, U. S.—Syrup of Ipecac.

Tinctura Ipecacuanhæ et Opii, U. S.—Tincture of Ipecac and Opium.

Vinum Ipecacuanhæ, U. S.—Wine of Ipecac.

Pulvis Ipecacuanhæ et Opii, U. S.—Powder of Ipecac and Opium.

COCA, U. S.—Coca. (*Erythroxylon*, *Pharm.* 1880.)—The leaves of *Erythroxylon coca* contain *cocaine*, $C_{17}H_{21}NO_4$, and *hygrine* combined with cocatannic acid.

Extractum Erythroxylî Fluidum, U. S.—Fluid Extract of Erythroxylon.

GUARANA, U. S.—Guarana.—A dried paste, prepared from the crushed or ground seeds of *Paullinia sorbilis*, containing *caffeine*, $C_8H_{10}N_4O_2$, about 25 per cent. of tannin, resin, mucilage, starch, volatile oil, saponin, etc.

Extractum Guarane Fluidum, U. S.—Fluid Extract of Guarana.

CAFFEINA, U. S.—Caffeine. $C_8H_{10}N_4O_2 + H_{20} = 211.68$ (Theine).—A feebly basic proximate principle obtained from the dried leaves of *Thea sinensis*, or from the dried seeds of the *Coffea arabica*, or from *Guarana*, and found also in other plants. Fleecy masses of long, flexible, white crystals, possessing a silky lustre, without odor, having a bitter taste, and permanent in the air. Obtained from a decoction of tea or coffee by precipitating with lead acetate, removing the lead by H_2S , adding $AmHO$, evaporating, and recrystallizing.

CAFFEINA CITRATA, U. S.—Citrated Caffeine.—A white powder; odorless; having a purely acid taste, and an acid reaction; prepared by adding caffeine to a solution of citric acid, evaporating, and reducing the product to powder.

CAFFEINA CITRATA EFFERVESCENS, U. S.—Effervescent Citrated Caffeine.—An effervescing, coarse, granular powder, prepared by uniting together caffeine, citric acid, sodium bicarbonate, tartaric acid, and sugar, making a paste with alcohol, rubbing the same through a No. 6 tinned iron sieve or enameled colander, and drying the powder.

CONIUM, U. S.—Conium. (*Hemlock*).—The full-grown fruit of *Conium maculatum*, gathered while yet green, and containing *conine*, $C_8H_{17}N$; *conhydrine*, $C_8H_{17}NO$; and *methylconine*, $C_9H_{16}CH_3N$; also a little volatile oil and fixed oil. Conium is a liquid volatile alkaloid, containing no oxygen, and with an odor resembling that of the urine of mice.

Abstractum Conii, U. S.—Abstract of Conium.

Extractum Conii Alcoholicum, U. S.—Alcoholic Extract of Conium.

Extractum Conii Fluidum, U. S.—Fluid Extract of Conium.

Tinctura Conii, U. S.—Tincture of Conium.

LOBELIA, U. S.—Lobelia.—The leaves and tops of *Lobelia inflata*, collected after a portion of the capsules have been inflated, contain *lobeline*, *lobelic acid*, *lobelacrin*, wax, resin, gum, etc. *Lobeline* is a liquid alkaloid, and contains no oxygen.

Acetum Lobeliæ, U. S.—Vinegar of Lobelia.

Extractum Lobeliæ Fluidum, U. S.—Fluid Extract of Lobelia.

Tinctura Lobeliæ, U. S.—Tincture of Lobelia.

TABACUM, U. S.—Tobacco.—The commercial dried leaves of

Nicotiana tabacum, containing nicotine, $C_{10}H_{14}N_2$, a liquid alkaloid, which is colorless, very acrid, poisonous, and rapidly turns brown on exposure to air; soluble in water, alcohol, and ether.

PRODUCTS FROM ANIMAL SUBSTANCES.

The animal products of pharmaceutical interest are not numerous, but some of them are very important. Their chemical composition is not very well understood.

Official Products Derived from the Class Mammalia.

ADEPS, U. S.—Lard.—The prepared internal fat of the abdomen of *Sus scrofa* (Class, *Mammalia*, Order, *Pachydermata*), purified by washing with water, melting, and straining. Lard should be preserved in securely-closed vessels, impervious to fat. It is a soft, white, unctuous solid. It melts at or near 35° C. (95° F.) to a clear, colorless liquid, and at or below 30° C. (86° F.) it is a soft solid; sp. gr. about 0.938; faint odor, free from rancidity; bland taste; neutral reaction; entirely soluble in ether, benzine, and disulphide of carbon.

ADEPS BENZOINATUS, U. S.—Benzoinated Lard. (*Unguentum Benzoini, Pharm. 1870.*)—Benzoin 2 p., Lard 100 p.

ADEPS LANÆ HYDROSUS, U. S.—Hydrous Wool-Fat.—The purified fat of the wool of the sheep, *Ovis aries* Linné (Class, *Mammalia*; Order, *Ruminantia*), mixed with not more than 30 per cent. of water. A yellowish-white, or nearly white, ointment like mass, having a faint, peculiar odor. Insoluble in water, but miscible with twice its weight of the latter without losing its ointment-like character. It melts at about 40° C. (104° F.).

OLEUM ADIPIS, U. S.—Lard Oil.—A fixed oil expressed from lard at a low temperature.

SEVUM, U. S.—Suet.—The internal fat of the abdomen of *Ovis aries* (Class, *Mammalia*; Order, *Ruminantia*), purified by melting and straining. Suet should be kept in well-closed vessels impervious to fat. It should not be used after it has become rancid. It is a white, smooth, solid fat; nearly inodorous, gradually becoming rancid on exposure to air; bland taste, neutral reaction.

PANCREATINUM, U. S.—Pancreatin.—A mixture of the enzymes naturally existing in the pancreas of warm-blooded animals, usually obtained from the fresh pancreas of the hog, *Sus scrofa* (Class, *Mammalia*; Order, *Pachydermata*). A yellowish, yellowish-white, or grayish, amorphous powder, odorless, or having a faint, peculiar, not unpleasant odor, and a somewhat meat-like taste. Slowly and almost completely soluble in water, insoluble in alcohol.

Pancreatin digests albuminoids, and converts starch into sugar.

PEPSINUM, U. S.—Pepsin.—A proteolytic ferment or enzyme obtained from the glandular layer of fresh stomachs from healthy pigs, and capable of digesting not less than 3000 times its own weight of freshly

coagulated and disintegrated egg albumin, when tested by the process given below. A fine, white, or yellowish-white, amorphous powder, or thin, pale yellow or yellowish, transparent or translucent grains or scales, free from any offensive odor, and having a mildly acidulous or slightly saline taste, usually followed by a suggestion of bitterness. Soluble, or for the most part soluble, in about 100 parts of water, with more or less opalescence; more soluble in water, acidulated with hydrochloric acid; insoluble in alcohol, ether, or chloroform.

VALUATION OF PEPSIN.—Prepare first the three following solutions:—

a. Water, 294 c.c.; HCl, 6 c.c. *b.* In 100 c.c. of *a*, dissolve 0.067 gm. of the pepsin to be tested. *c.* To 95 c.c., sol. A, at 40° C. (104° F.) add 5 c.c. of sol. B. The resulting 100 c.c. of liquid will contain 0.2 c.c. (0.21 gm.) of absolute HCl, 0.00335 gm. of the pepsin to be tested, and 98 c.c. of water. Immerse an egg 15 m. in boiling water, remove, and place in cold water. When cold rub the albumen through a No. 30 sieve, reject the first portion, take 10 gm. of the second cleaner portion, place it in a 200 c.c. flask; add $\frac{1}{2}$ of sol. C., shake well, add the second $\frac{1}{2}$ of sol. C., shake well, place in a water-bath or thermostat at 30° to 40° C. (100 4° to 104° F.) for 6 hours, shaking gently every 15 minutes. At the expiration of this time the albumen should have disappeared, leaving at most only a few thin, insoluble flakes.

The relative proteolytic power of pepsin stronger or weaker than that described above may be determined by ascertaining, through repeated trials, how much of sol. B. made up to 100 c.c. with sol. A. will be required exactly to dissolve 10 gm. of coagulated and disintegrated albumen under the conditions given above.

PEPSINUM SACCHARATUM, U. S.—Saccharated Pepsin.—Pepsin, the digestive principle of the gastric juice, obtained from the mucous membrane of the stomach of the hog, and mixed with powdered sugar of milk.

Preparation.—Prof. Scheffer's Process: Macerate mucous membranes of hogs' stomachs in very dilute HCl, precipitate pepsin with NaCl, skim, drain, dry, and dilute with sugar of milk until 10 grs. will dissolve 500 grs. coagulated albumen. Saccharated pepsin is a white powder; slight, but not disagreeable odor; slight, but not disagreeable taste. It is not completely soluble in water, leaving floccules of pepsin floating in the solution, which, however, dissolve on the addition of a small quantity of hydrochloric acid.

LIQUOR PEPSINI, U. S.—Solution of Pepsin. (*Liquid Pepsin.*)—Saccharated Pepsin 40 p.; Hydrochloric Acid 12 p.; Glycerin 400 p.; Water 548 p.

MOSCHUS, U. S.—Musk.—The dried secretion from the preputial follicles of *Moschus moschiferus* (Class, *Mammalia*; Order, *Ruminantia*) contains cholesterin, ammonia, and acid principle, wax, fat, albuminous and gelatinous principles, and an odorous matter not yet determined.

Tinctura Moschi, U. S.—Tincture of Musk.

ACIDUM LACTICUM, U. S.—Lactic Acid.—A liquid composed of 75 per cent. of absolute lactic acid ($\text{HC}_3\text{H}_5\text{O}_3$; 90) and 25 per cent.

of water; made from sour milk, cheese, meat juice, lacticin, and from many vegetable products. Cane sugar is treated with sulphuric acid, so as to convert it into invert sugar, solution of caustic soda added, and the mixture heated until it ceases to precipitate Fehling's solution, showing the absence of sugar. Sulphuric acid is added, and the sodium sulphate formed is crystallized out, an addition of alcohol causing the precipitation of the remainder. The alcoholic liquid contains impure lactic acid; one-half of it is heated and zinc carbonate added until effervescence ceases; the other half of the alcoholic liquid is now added, and the whole allowed to cool. Zinc lactate crystallizes out; this, by treatment with hydrosulphuric acid, yields zinc sulphide, lactic acid remaining in solution. Acidum lacticum is a nearly colorless liquid; sp. gr. 1.212; odorless; very acid taste; acid reaction; freely miscible with ether, but nearly insoluble in chloroform.

SACCHARUM LACTIS, U. S.—Sugar of Milk. $C_{12}H_{22}O_{11} \cdot H_2O$; 360.—A peculiar, crystalline sugar obtained from the whey of cow's milk by evaporation and purified by recrystallization. It occurs in the form of white, hard, crystalline masses, yielding a white powder feeling gritty on the tongue, permanent in the air; odorless; faintly sweet taste; neutral reaction.

FEL BOVIS, U. S.—Ox Gall.—The fresh gall of *Bos taurus* (Class, *Mammalia*; Order, *Ruminantia*) contains *glycocholic acid*, $C_{26}H_{43}NO_6$; *taurocholic acid*, $C_{26}H_{45}NSO_7$; *hyoglycocholic acid*, $C_{27}H_{43}NO_5$; *hyotaurocholic acid*, $C_{27}H_{45}NSO_6$, and *chenotaurocholic acid*, $O_{29}H_{49}NSO_6$. A brownish-green or dark-green, somewhat viscid liquid, having a peculiar odor; a disagreeable, bitter taste, and a neutral or faintly alkaline reaction; sp. gr. 1.018–1.028.

FEL BOVIS PURIFICATUM, U. S.—Purified Ox Gall.—Fresh Ox Gall 3 p.; Alcohol 1 p. Evaporate the ox gall in a porcelain capsule, on a water-bath, to *one part*, then add to it the alcohol, agitate the mixture thoroughly, and let it stand, well covered, for twenty-four hours. Decant the clear solution, filter the remainder, and, having mixed the liquids and distilled off the alcohol, evaporate to a pilular consistence.

Official Products of the Class Pisces.

ICHTHYOCOLLA, U. S.—Isinglass.—The swimming bladder of *Acipenser huso*, and of other species of *Acipenser* (Class, *Pisces*; Order, *Sturiones*).

Emplastrum Ichthyocolle, U. S.—Isinglass Plaster.

CETACEUM, U. S.—Spermaceti.—A peculiar, concrete, fatty substance, obtained from *Physeter macrocephalus* (Class, *Mammalia*; Order, *Metacea*) contains *cerin*, *cerin elain*, which, when saponified, yield *cerin-elaic acid*, an acid resembling, but distinct from, oleic acid. The cerin is essentially *cetyl palmitate*, $C_{16}H_{31}(C_{16}H_{33}O_2)$. There are small amounts of fats containing *stearic acid*, $C_{18}H_{36}O_2$; *myristic acid*, $C_{14}H_{28}O_2$; and *lauro-stearic acid*, $C_{12}H_{24}O_2$, and the alcohol radicals corresponding to these acids.

Ceratum Cetacei, U. S.—Spermaceti Cerate.

OLEUM MORRHUÆ, U. S.—Cod-Liver Oil.—A fixed oil ob-

tained from the fresh livers of *Gadus morrhua*, or of other species of *Gadus* (Class, *Pisces*; Order, *Teleostia*; Family, *Gadida*).

Preparation.—Heat the livers in a wooden tank by means of low-pressure steam, and drain off the oil. In the case of the finest varieties, the oil, which is made only in the winter months, is drawn off by taps from the bottom of the cooking tank, and then put into a cooling house to freeze. The solid frozen mass is put into canvas bags, and submitted, while at a low temperature, to severe pressure, whereby the pure oil is expressed. This constitutes the light oil of commerce. Cod-liver oil consists chiefly of olein, some palmitin, and stearin, with minute traces of iodine, chlorine, bromine, phosphorus, and sulphur. *Oleum Morrhue* is a colorless or pale yellow, thin, oily liquid. When cooled to near 0° C. (32° F.), a white, granular matter separates; sp. gr. 0.920–0.925; slightly fishy odor; bland, slightly fishy taste; faintly acid reaction.

Official Products of the Class Aves.

VITELLUS, U. S.—Yolk of Egg.—The yolk of the egg of *Gallus bankiva*, var. *domesticus* (Class, *Aves*; Order, *Gallinae*), contains *vitellin*, a protein compound resembling casein, albumen, fat, cholesterin, inorganic salts, coloring matter, etc.; water 50 per cent. *White of egg* consists principally of albumen, with 80 per cent. of water. The inorganic salt present in largest proportion is potassium chloride.

Glyceritum Vitelli, U. S.—Glycerite of Yolk of Egg.

Official Products of the Class Insecta.

CANTHARIS, U. S.—Cantharides. (*Spanish Flies*.)—*Cantharis vesicatoria* (Class, *Insecta*; Order, *Coleoptera*.) Cantharides should be kept in well-closed vessels containing a little camphor. Cantharides owe their blistering properties to *cantharidin*, $C_{10}H_{12}O_4$, a white substance, in the form of crystalline scales, of a shining micaceous appearance; inodorous; tasteless.

Ceratum Cantharidis, U. S.—Cantharides Cerate.

Ceratum Extracti Cantharidis, U. S.—Cerate of Extract of Cantharides.

Charta Cantharidis, U. S.—Cantharidis Paper.

Collodium cum Cantharide, U. S.—Collodion with Cantharides.

Linimentum Cantharidis, U. S.—Cantharides Liniment.

Tinctura Cantharidis, U. S.—Tincture of Cantharides.

COCCUS, U. S.—Cochineal.—The dried female of *Coccus cacti* (Class, *Insecta*; Order, *Hemiptera*) owes its red color to carminic acid. $C_{17}H_{18}O_{10}$. It contains mucilage, fat, inorganic salts, etc.

CERA FLAVA, U. S.—Yellow Wax.—A peculiar, concrete substance, prepared by *Apis mellifica* (Class, *Insecta*; Order, *Hymenoptera*).

CERA ALBA, U. S.—White Wax.—Yellow wax bleached. A yellowish or brownish-yellow solid. It is brittle when cold, but becomes plastic by the heat of the hand. It melts at 63°–64° C. (145.4°–147.2° F.), and congeals with a smooth and level surface; sp. gr. 0.955–0.967; agreeable, honey-like odor; faint, balsamic taste. Beeswax is a mixture of three different substances, which may be separated from one another by alcohol, viz.: 1, *myricin*, insoluble in boiling alcohol, and consisting

chiefly of myricil palmitate, $C_{16}H_{31}(C_{20}H_{41}O_2)$, which is a compound of *palmitic acid*, $C_{16}H_{32}O_2$, and *myricyl alcohol*, $C_{20}H_{42}O$; 2, *cerotic acid*, $C_{27}H_{54}O_2$ (formerly called *cerin* when obtained only in an impure state), which is dissolved by boiling alcohol, but crystallizes out on cooling; 3, *cerolein*, which remains dissolved in the cold alcoholic liquid. This latter is probably a mixture of fatty acids, as indicated by its acid reaction to litmus paper. (Remington.)

UNITED STATES COAST AND GEODETIC SURVEY.

By Permission of T. C. MEN-

TABLES FOR CONVERTING U. S. WEIGHTS

LINEAR.

	<i>Inches to millimeters.</i>	<i>Feet to meters.</i>	<i>Yards to meters.</i>	<i>Miles to kilometers.</i>
1 =	25.4000	0.304801	0.914402	1.60935
2 =	50.8001	0.609601	1.828804	3.21869
3 =	76.2001	0.914402	2.743205	4.82804
4 =	101.6002	1.219202	3.657607	6.43739
5 =	127.0002	1.524003	4.572009	8.04674
6 =	152.4003	1.828804	5.486411	9.65608
7 =	177.8003	2.133604	6.400813	11.26543
8 =	203.2004	2.438405	7.315215	12.87478
9 =	228.6004	2.743205	8.229616	14.48412

SQUARE.

	<i>Square inches to square centimeters.</i>	<i>Square feet to square decimeters.</i>	<i>Square yards to square meters.</i>	<i>Acres to hectares.</i>
1 =	6.452	9.290	0.836	0.4047
2 =	12.903	18.581	1.672	0.8094
3 =	19.355	27.871	2.508	1.2141
4 =	25.807	37.161	3.344	1.6187
5 =	32.258	46.452	4.181	2.0234
6 =	38.710	55.742	5.017	2.4281
7 =	45.161	65.032	5.853	2.8328
8 =	51.613	74.323	6.689	3.2375
9 =	58.065	83.613	7.525	3.6422

CUBIC.

	<i>Cubic inches to cubic centimeters.</i>	<i>Cubic feet to cubic meters.</i>	<i>Cubic yards to cubic meters.</i>	<i>Bushels to hectoliters.</i>
1 =	16.387	0.02832	0.765	0.35242
2 =	32.774	0.05663	1.529	0.70485
3 =	49.161	0.08495	2.294	1.05727
4 =	65.549	0.11327	3.058	1.40969
5 =	81.936	0.14158	3.823	1.76211
6 =	98.323	0.16990	4.587	2.11454
7 =	114.710	0.19822	5.352	2.46696
8 =	131.097	0.22654	6.116	2.81938
9 =	147.484	0.25485	6.881	3.17181

The only authorized material standard of customary length is the Troughton scale. The yard in use in the United States is therefore equal to the British yard.

The only authorized material standard of customary weight is the Troy pound of the It was derived from the British standard Troy pound of 1758 by direct comparison. The

The grain Troy is therefore the same as the grain Avoirdupois, and the pound Avoir

The British gallon = 4.54346 liters.

The British bushel = 36.3477 liters.

OFFICE OF STANDARD WEIGHTS AND MEASURES.
DENHALL, Superintendent.
AND MEASURES—CUSTOMARY TO METRIC.

CAPACITY.

	<i>Fluid drams to milliliters or cubic centimeters.</i>	<i>Fluid ounces to milliliters.</i>	<i>Quarts to liters.</i>	<i>Gallons to liters.</i>
1 =	3.70	29.57	0.94636	3.78544
2 =	7.39	59.15	1.89272	7.57088
3 =	11.09	88.72	2.83908	11.35632
4 =	14.79	118.30	3.78544	15.14176
5 =	18.48	147.87	4.73180	18.92720
6 =	22.18	177.44	5.67816	22.71264
7 =	25.88	207.02	6.62452	26.49808
8 =	29.57	236.59	7.57088	30.28352
9 =	33.28	266.16	8.51724	34.06896

WEIGHT.

	<i>Grains to milligrammes.</i>	<i>Avoirdupois ounces to grammes.</i>	<i>Avoirdupois pounds to kilogrammes.</i>	<i>Troy ounces to grammes.</i>
1 =	64.7989	28.3495	0.45359	31.10348
2 =	129.5978	56.6991	0.90719	62.20696
3 =	194.3968	85.0486	1.36078	93.31044
4 =	259.1957	113.3981	1.81437	124.41392
5 =	323.9946	141.7476	2.26796	155.51740
6 =	388.7935	170.0972	2.72156	186.62089
7 =	453.5924	198.4467	3.17515	217.72437
8 =	518.3914	226.7962	3.62874	248.82785
9 =	583.1903	255.1457	4.08233	279.93133

1 chain	=	20.1169	meters.
1 square mile	=	259	hectares.
1 fathom	=	1.829	meters.
1 nautical mile	=	1853.27	meters.
1 foot	=	0.304801 meter,	log.
1 avoird. pound	=	453.5924277	grammes.
15432.35639 grains	=	1	kilogram.

belonging to this office, whose length at 59.62° Fahr. conforms to the British standard.

Mint. It is of brass of unknown density, and therefore not suitable for a standard of mass. British Avoirdupois pound was also derived from the latter, and contains 7000 grains Troy. dupois in use in the United States is equal to the British pound Avoirdupois.

WASHINGTON, D. C., January, 1890.

UNITED STATES COAST AND GEODETIC SURVEY.

By Permission of T. C. MEN

TABLE FOR CONVERTING U. S. WEIGHTS

LINEAR.				
	<i>Meters to inches.</i>	<i>Meters to feet.</i>	<i>Meters to yards.</i>	<i>Kilometers to miles.</i>
1 =	39.3700	3.28083	1.093611	0.62137
2 =	78.7400	6.56167	2.187222	1.24274
3 =	118.1100	9.84250	3.280833	1.86411
4 =	157.4800	13.12333	4.374444	2.48548
5 =	196.8500	16.40417	5.468056	3.10685
6 =	236.2200	19.68500	6.561667	3.72822
7 =	275.5900	22.96583	7.655278	4.34959
8 =	314.9600	26.24667	8.748889	4.97096
9 =	354.3300	29.52750	9.842500	5.59233

SQUARE.				
	<i>Square centimeters to square inches.</i>	<i>Square meters to square feet.</i>	<i>Square meters to square yards.</i>	<i>Hectares to acres.</i>
1 =	0.1550	10.764	1.196	2.471
2 =	0.3100	21.528	2.392	4.942
3 =	0.4650	32.292	3.588	7.413
4 =	0.6200	43.055	4.784	9.884
5 =	0.7750	53.819	5.980	12.355
6 =	0.9300	64.583	7.176	14.826
7 =	1.0850	75.347	8.372	17.297
8 =	1.2400	86.111	9.568	19.768
9 =	1.3950	96.874	10.764	22.239

CUBIC.				
	<i>Cubic centimeters to cubic inches.</i>	<i>Cubic decimeters to cubic inches.</i>	<i>Cubic meters to cubic feet.</i>	<i>Cubic meters to cubic yards.</i>
1 =	0.0610	61.023	35.314	1.308
2 =	0.1220	122.047	70.629	2.616
3 =	0.1831	183.070	105.943	3.924
4 =	0.2441	244.093	141.258	5.232
5 =	0.3051	305.117	176.572	6.540
6 =	0.3661	366.140	211.887	7.848
7 =	0.4272	427.163	247.201	9.156
8 =	0.4882	488.187	282.516	10.464
9 =	0.5492	549.210	317.830	11.771

By the concurrent action of the principal governments of the world an International of the International Committee, two ingots were cast of pure platinum-iridium in the certain number of kilogrammes were prepared, from the other a definite number of preference, and certain ones were selected as International prototype standards. The prototype standards. Those apportioned to the United States are in the keeping of

The metric system was legalized in the United States in 1866.

The International Standard Meter is derived from the Meter des Archives, and its iridium bar deposited at the International Bureau of Weights and Measures.

The International Standard Kilogramme is a mass of platinum-iridium deposited at the

The liter is equal to a cubic decimeter of water, and it is measured by the quantity kilogramme in a vacuum, the volume of such a quantity of water being, as nearly as has

OFFICE OF STANDARD WEIGHTS AND MEASURES.

DENHALL, Superintendent.

AND MEASURES—METRIC TO CUSTOMARY.

CAPACITY.

	<i>Millimeters or cubic centimeters to fluid drams.</i>	<i>Centiliters to fluid ounces.</i>	<i>Liters to quarts.</i>	<i>Decaliters to gallons.</i>	<i>Hectoliters to bushels.</i>
1 ==	0.27	0.338	1.0567	2.6417	2.8375
2 ==	0.54	0.676	2.1134	5.2834	5.6750
3 ==	0.81	1.014	3.1700	7.9251	8.5125
4 ==	1.08	1.352	4.2267	10.5668	11.3500
5 ==	1.35	1.691	5.2834	13.2085	14.1875
6 ==	1.62	2.029	6.3401	15.8502	17.0250
7 ==	1.89	2.368	7.3968	18.4919	19.8625
8 ==	2.16	2.706	8.4534	21.1336	22.7000
9 ==	2.43	3.043	9.5101	23.7753	25.5375

WEIGHT.

	<i>Milligrammes to grains.</i>	<i>Kilogrammes to grains.</i>	<i>Hectogrammes (100 grammes) to ounces Av.</i>	<i>Kilogrammes to pounds Avoirdupois.</i>
1 ==	0.01543	15432.36	3.5274	2.20462
2 ==	0.03086	30864.71	7.0548	4.40924
3 ==	0.04630	46297.07	10.5822	6.61386
4 ==	0.06173	61729.43	14.1096	8.81849
5 ==	0.07716	77161.78	17.6370	11.02311
6 ==	0.09259	92594.14	21.1644	13.22773
7 ==	0.10803	108026.49	24.6918	15.43235
8 ==	0.12346	123458.85	28.2192	17.63697
9 ==	0.13889	138891.21	31.7466	19.84159

WEIGHT—(CONTINUED).

	<i>Quintals to pounds Av.</i>	<i>Milliers or tonnes to pounds Av.</i>	<i>Grammes to ounces, Troy.</i>
1 ==	220.46	2204.6	0.03215
2 ==	440.92	4409.2	0.06430
3 ==	661.38	6613.8	0.09645
4 ==	881.84	8818.4	0.12860
5 ==	1102.30	11023.0	0.16075
6 ==	1322.76	13227.6	0.19290
7 ==	1543.22	15432.2	0.22505
8 ==	1763.68	17636.8	0.25721
9 ==	1984.14	19841.4	0.28936

Bureau of Weights and Measures has been established near Paris. Under the direction of nine parts of the former to one of the latter metal. From one of these a meter bars. These standards of weight and length were intercompared, without others were distributed by lot to the different governments, and are called National this office.

length is defined by the distance between two lines at 60° Centigrade, on a platinum-same place, and its weight in vacuo is the same as that of the Kilogramme des Archives, of distilled water which, at its maximum density, will counterpoise the standard been ascertained, equal to a cubic decimeter.

INDEX

Abies balsamea, 137
canadensis, 137
excelsa, 137
pectinata, 137
Absinthin, 133
Absinthium, oil, 133
Acacia, 107
catechu, 152
Aceta, 42
Acetone, 101
Acetanilid, 104
Acetanilidum, 104
Acid, acetic, 101
 diluted, 102
 glacial, 102
 aconitic, 162
 anthemic, 162
 arsenious, 96
 solution, 97
 artanthic, 130
 arabic, 107
 benzoic, 138
 boracic, 61
 boric, 61
 carbolic, 104
 carminic, 167
 cathartic, 147
 cerotic, 168
 cetin-elaic, 166
 cetraric, 106
 cheledonic, 161
 chenotaurocholic,
 166
 chromic, 87
 chrysophanic, 148
 cinchotannic, 156
 cinnamic, 125
 citric, 118
 copaivic, 131
 cresylic, 104
 ethyl-sulphuric, 112
 eugenic, 125
 euonic, 149
 filicic, 134
 filitannic, 134
 fumaric, 106
 gallic, 141
 gambogic, 148
 gelseminic, 158
 gentisic, 144
 glycocholic, 166
 glycyrrhizic, 166
 guaiacic, 138
 guaiaconic, 138

Acid, guaiaretic, 138
 hydrobromic, diluted
 53
 hydrochloric, 53
 diluted, 53
 hydrocyanic, diluted,
 128
 hydrosulphuric, 58
 hyoglycocholic, 166
 hyotaurocholic, 166
 hypophosphorous, 53
 igasuric, 157
 ippecacuanhic, 162
 kinic, 156
 kinotannic, 152
 kinovic, 156
 kramero-tannic, 152
 lactic, 165
 lauro-stearic, 166
 lichen-stearic, 106
 lobelic, 163
 lupamaric, 132
 malic, 118
 meconic, 154
 muriatic, 54
 diluted, 54
 myristic, 166
 nitric, 54
 diluted, 54
 nitrohydrochloric, 54
 diluted, 55
 nitrous, 54
 oleic, 140, 141
 orthophosphoric, 60
 oxalic, 101
 palmitic, 140, 168
 phosphoric, 56
 diluted, 56
 piperic, 130
 podophyllinic, 149
 polygalic, 147
 prussic, 128
 pyrogallic, 152
 pyrophosphoric, 60
 quinic, 156
 quinovic, 156
 rheotannic, 148
 rheumic, 148
 salicylic, 104
 santallic, 147
 sclerotic, 146
 stearic, 140, 141
 sulphuric, 55
 aromatic, 55

Acid, sulphuric, diluted, 55
 sulphurous, 56
 tannic, 151
 tartaric, 117
 taurocholic, 166
 toxicodendric, 147
 valerianic, 132
Acids, inorganic, 52
Acipenser Huso, 166
Aconine, 162
Aconite, 162
Aconitine, 162
Aconitum, 162
 napellus, 162
Acorus calamus, 127
Acrinyl thiocyanate, 129
Adapters, 16
Adeps, 164
 benzoinatus, 164
 lanæ hydrosus, 154
Æther, 112
 aceticus, 114
 fortior, 113
Alcohol, 111
 absolute, 112
 diluted, 112
 ethyl, 111
 glyceric, 142
Alcoholmeters, 11
Aldehyd, 115
Alembic, 16
Alkaloids, 153
Allium, 129
 sativum, 129
Allspice, 125
 oil, 125
Allyl sulphate, 129
 sulphide, 129
Allyl-iso-thiocyanate, 129
Almond, bitter, 128
 oil, 128
 expressed oil, 140
 sweet, 140
Aloe, 149
Aloin, 149-150
Aloinum, 150
Althæa, 148
Alum, 82
Aluminium, 80
 salts, 82
Amandin, 140
Amber, 103
 oil, 103
 hellebore, 161

- Amber, wormseed, 132
Amides, 153
Amines, 153
Ammoniac, 137
Ammonium, 62
 salts of, 74
Amygdala amara, 128
 dulcis, 140
Amygdalin, 128
 communis, 128, 134
Amyl nitrite, 114
Amylum, 104
Anacyclus pyrethrum, 130
Andira araroba, 148
Anemone patens, 135
 pratensis, 135
Anemonin, 135
Anethol, 121
Anise, 124
 camphor, 124
 oil, 124
 star, 124
Anisum, 124
Anthemis, 134
 nobilis, 134
 oil, 134
Antidote, Bibron's, 58
 for arsenic, 85
Antimony, 95
 salts, 95
Apis mellifica, 109, 167
Apocynin, 135
Apocynin, 135
Apocynum, 135
 cannabinum, 135
Apomorphine, 154
Aporetin, 148
Aqua, 52
 chlori, 57
 destillata, 52
 regia, 57
Aque, 30
Arabin, 106
Arbutin, 153
Arctostaphylos uva ursi,
 153
Are, 5
Argentum, 91
Argols, 170
Aristolochia serpentaria,
 130
Arnica, 133
 flowers, 133
 montana, 133
 root, 133
Arnica, 133
Arsenicum, 95
 salts, 96
Asafetida, 137
Asclepias, 135
 tuberosa, 135
Asclepidin, 135
Asparagin, 108
Aspidium, 134
Astragalus gummifer, 107
Atropa belladonna, 159
Atropine, 159
Aurantii, 120

Bacteria, 110
Balances, 6
Balm, 122
Balsam copaiba, 130
 fir, 137
 Peru, 138
 tolu, 138
Balsamodendron myrrh,
 138
Balsams, 131
Barbaloin, 150
Barium, 77
Barosma betulina, 130
 crenulata, 130
 serratifolia, 130
Basham's mixture. See
 Mistura Ferri et Am-
 monii Acetas, 34
Basilicon ointment. See
 Ceratum Resinæ, 48
Bassorin, 136
Baths, 13
 glycerin, 13
 oil, 13
 salt water, 13
 sand, 13
 steam, 13
 water, 13
Bay, oil, 125
Bearberry, 153
Berberine, 162
Belladonnine, 159
Belladonna, 159
Benzin, 143
Benzoin, 137
Benzoinated lard, 164
Bergamot, oil, 121
Bismuth, 97
 salts, 97
Bisulphide, carbon, 59
Bittersweet, 160
Bitter wine of iron, 84
Black haw, 132
 mustard, 129
 oil, 129
Blackberry, 153
Bloodroot, 161
Blowpipe, 12
Blue cohosh, 147
 flag, 135
 mass, 92
 ointment, 92
 pill, 92
 vitriol, 91
Boiling, 14
Boneset, 134
Borax, 69
Boron, 61
Botanical name, 2
Brandy, 117
Brayera, 146
Bromine, 57
Broom, 130
Brucine, 157
Bruising, 17
Bryonia, 150
Bryonin, 150
Bryoretin, 150
Buchu, 130
Bunsen burner, 11
Burnett's disinfecting fluid,
 81
Butternut, 149

Cacao butter, 141
Cadmium, 80, 83
Caffeine, 163
Cajuput, oil, 125
Cajuputene, hydrate, 125
Cajuputol, 125
Calabar bean, 158
Calabarin, 158
Calamine, 80
Calamus, 127
Calcination, 13
Calcium, 77
 salts, 78
Calendula, 133
Calendulin, 123
Calisaya bark, 155
Calomel, 93
Calumba, 144
Calx chlorata, 57
Calx, 78
Cambogia (gamboge), 148
Camphor, 128
 monobromata, 128
Canadian hemp, 135
Cane sugar, 109
 indica, 130
Cantharides, 167
Cantharidin, 167
Cantharis, 167
Caoutchouc, 137
Capsicum, 130
Caraway, 123
 oil, 123
 seed, 123
Carbo animalis, 61
 ligni, 61
Carbon, 61, 100
 disulphide, 59
Carbonization, 13
Cardamom, 127
Carrageenin, 106
Carum, 123
Carvene, 123
Carvol, 123
Caryophyllin, 125
Caryophyllus, 125
Cascara sagrada, 144
Cascarilla, 125
Cascarillin, 126
Cassia, 148
 fistula, 148
Castanea, 153
Castor oil, 141

- Catechin, 152
 Catechol, 152
 Catechu, 152
 Caulophyllin, 147
 Caulophyllum, 147
 Cayenne pepper, 130
 Celandine, 161
 Cellulin, 100
 Cellulose, 100
 Centimetre, 6
 Cephaëlis ipecacuanhæ, 162
 Cera alba, 167
 flava, 167
 Cerasin, 106
 Cerasus serotina, 128
 virginiana, 128
 Cerates, 47-48
 Ceratum, 47-48
 Cerium, 82
 Cerolein, 168
 Cetaceum, 166
 Cetin, 166
 Cetin-elain, 166
 Cetraria, 106
 Chalk, mixture, 80
 precipitated, 79
 prepared, 79
 Chamomile, 134
 Charcoal, 61, 101
 Chartæ, 49
 Chelerythrine, 161
 Chelidonine, 161
 Chelidonium, 161
 Chelidoxanthin, 161
 Chenopodium, 132
 Chestnut, 153
 Chimaphilla, 153
 Chimaphillin, 153
 Chinoidin, 157
 Chinoidinum, 157
 Chirata, 144
 Chiratin, 144
 Chloral, 115
 Chlorine, 57
 water, 57
 Chloroform, 115
 Chondodendron tomento-
 sum, 162
 Chondrus, 106
 Chopping, 17
 Chromium, 83, 89
 Chrysarobin, 148
 Chrysophanic acid, 148
 Cimicifuga, 135
 Cimicifugin, 135
 Cinchona, 155
 alkaloids, 155
 salts, etc., 155
 Cinnabar, 95
 Cinnamon, 124
 Cissampeline, 162
 Citrine ointment, 95
 Clarification, 19, 20
 Cleavage, 22
 Cloves, 125
 oil, 125
 Coal, 103
 tar, 103
 Cobalt, 89
 Coca, 158, 163
 Cocaine, 158, 163
 Coccus, 167
 Cochineal, 167
 Codeina, 155
 Cod-liver oil, 167
 Codeine, 155
 Colation, 20
 Colchicum, 161
 Colchicine, 161
 Cold cream. See *Unguen-
 tum aquæ rosæ*, 48
 Collodia, 35
 Colocynth, 150
 Colocynthein, 150
 Colocynthin, 150
 Colocynthis, 150
 Colocynthitin, 150
 Colombin, 144
 Colophony, 137
 Columbo, 144
 Comminution, 17
 Condenser, 16
 Confectiones, 45
 Conium, 163
 Contusion, 17
 Convallaria, 144
 Convolvulin, 142
 Convolvulinæ, 144
 Copaiba, 131
 Copper, 89
 salts, 91
 Copperas, 87
 Coriander, 123
 Corn silk, 104
 Corrosive sublimate, 93
 Cosmoline, 143
 Cotton, 100
 root bark, 146
 Couch grass, 110
 Cranesbill, 153
 Cream of tartar, 64
 Creasote, 101, 102
 Crocin, 146
 Crocus, 146
 Croton oil, 141
 Crucible, 13
 Crystallization, 21
 Cubebe, 130
 Cubic centimetre, 5
 Cucurbita pepo, 141
 Culver's root, 149
 Curso, 146
 Cutting, 17
 Cydonium, 108
 Cypripedin, 134
 Cypripedium, 134
 Dandelion, 145
 Daphne mezereum, 134
 Daphne, 134
 Daphnetin, 134
 Datura stramonium, 160
 Daturine, 160
 Decantation, 19, 20
 Decigramme, 6
 Decilitre, 6
 Decimal system, 6, 7
 Decimetre, 6
 Decocta, 37
 Decoctions, 37
 Decoloration, 21
 Deflagration, 13
 Delphinine, 161
 Delphinium, 161
 Desiccation, 14, 17
 Dewees's carminative, 78
 Dextrin, 106
 Dextro-glucose, 108
 Dextrose, 108
 Diachylon, 91
 Dialysis, 23
 Diastase, 106
 Digitalin, 145
 Digitaliretin, 145
 Digitalis, 145
 Digitoxin, 145
 Distillation, 15
 Displacement, 23
 Dispensatories, 1, 3
 Dolomite, 78
 Donovan's solution, 97
 Dorema ammoniacum, 137
 Dover's powder, 44
 Drop, 8
 Drug-mills, 17
 Dulcamara, 160
 Dulcamarine, 160
 Ebullition, 14
 Ecballium elaterium, 150
 Egg, albumen, 167
 white, 167
 Elæometre, 11
 Elastica, 137
 Elaterin, 150
 Elaterinum, 143-150
 Elaterium, 150
 Elder, 132
 Elecampane, 134
 Eleopten, 119
 Elettaria cardamomum, 127
 Elixiria, 35
 Elixirs, 35
 f.lm, 107
 Elutrition, 18
 Emetine, 162
 Emodin, 148
 Emplastra, 49
 Emulsion, 34
 Enflourage, 120
 English name, 2
 Epsom salt, 77
 Ergot, 146
 Erigeron, oil, 134
 Erythrorotin, 148
 Erythroxylin, 158

Eserine, 158
Essential oils, 119
Ether, 112
Etheral oil, 113
Eucalyptol, 128
Eucalyptus, 125
oil, 125
Eugenia, 125
Eugenin, 125
Eugenol, 125
Euonymin, 149
Euonymus, 149
Eupatorin, 134
Eupatorium, 134
Evaporation, 14
Excipients, 45
Exogonium purga, 148
Expression, 19, 23
Exsiccation, 14
Extracta, 42
Extracta, fluida, 40
Extract, Goulard's, 90
Extracts, 42

Fats, 133
Fel bovis, 166
Fennel, 123
Fermentation, 110
Ferrum, 83
Ficus, 148
Fig, 148
Filix mas, 134
Filtration, 20
Flask, 16
Flaxseed, 108
oil, 140
Fleabane, oil, 134
Fluigram, 5
Fluorine, 57
Foeniculum, 123
Fowler's solution, 97
Foxglove, 145
Frangula, 149
Frangulin, 149
Fraxinus ornus, 109
Fuel, 11
Funnel, 20
Furnace, 11
Fusel oil, 111
Fusion, 13

Gadus morrhua, 166
Galbanum, 138
Galena, 89
Galla, 151
Gallon, 5
Gamboge, 148
Garlic, 129
Gas, coal, 101
Gaultheria, 127
Goulard's Extract, 90
cerate, 90
Gelsemine, 158
Gelsemium, 158

Gentian, 144
Gentiana, 144
Gentiogenin, 144
Gentiopiecin, 144
Geranium, 153
German chamomile, 134
Gin, 111
Ginger, 127
Glass, soluble, 62
Glauber's salt, 73
Glucose, 108
Glucosides, 144
Glycerin, 142
Glycerita, 34
Glycyrrhiza, 109
Goa-powder, 148
Gold, 98
Golden seal, 162
Gossypium, 100
oil, 140
Graduate, 8
Grain, 4
Gramme, 6
Granatum, 162
Granulation, 14, 17
Grating, 17
Grindelia, 134
Grinding, 17
Grommet, 15
Guaiac, 138
Guaiacum, 138
Guarana, 163
Gums, 106
Gun cotton, 101
Gutta percha, 137
Gypsum, dried, 80

Hæmatein, 152
Hæmatoxylin, 152
Hæmatoxylon, 152
Halogens, 57
Hamamelis, 153
Heat, 11
Hedeoma, 122
Hoffman's anodyne, 111
Honey, 33
Honeys, 33
Hoods, 15
Hops, 130
Horehound, 122
Humulus, 130
Hydrargyrum, 92
Hydrastine, 162
Hydrastis, 162
Hydrogen, 52
Hydrometers, 10
Hyoscinæ hydrobromas,
139
Hyoscyamine, 159
Hyoscyamus, 159

Iceland moss, 106
Ichthyocolla, 166
Igasurine, 157

Ignatia, 158
Ignition, 13
Illicium, 124
Incineration, 13
India rubber, 137
Indian cannabis, 132
hemp, 132
Infusa, 36
Infusions, 36
Inula, 134
Inulin, 134
Iodide, sulphur, 59
Iodine, 57-58
Iodoform, 116
Iodoformum, 116
Iodum, 58
Ipecac, 152
Ipecacuanha, 162
Iris, 135
Irish moss, 106
Iron, 83
Isinglass, 166
Ivory black, 61

Jaborandi, 160
Jalapa, 148
Jalapin, 148
Jalapinol, 148
James's powder, 96
Jateorrhiza calumba, 144
Javelle water, 57
Jervine, 161
Juglandin, 149
Juglans, 149
Juniperus, 133

Kainite, 67
Kamala, 148
Kelp, 58
Kilogram, 6
Kino, 151
Kinoin, 151
Kinovin, 156
Koosso, 146
Kosin, 146
Krameria, 152

Labarraque's solution, 57
Lactic acid, 165
Lactuca virosa, 135
Lactucarium, 135
Lactucin, 135
Lactucopiecin, 135
Lady's slipper, 134
Lappa, 145
Lard, 164
Lavender, 122
Lead, 89
water, 90
Lemon juice, 118
rind, 121
Leptandra, 149
Leptandrin, 149

- Levant wormseed, 146
 Levigation, 18
 Lichenin, 106
 Lichen-stearic acid, 106
 Liebig's condenser, 16
 Lignin, 100
 Lime, 77
 chlorinated, 57
 Linimenta, 36
 Liniments, 36
 Linseed, 108
 Linum, 108
 oil, 140
 Liquid pepsin, 155
 Liquores, 31
 Liquorice root, 109
 Litharge, 91
 Lithium, 62
 Liver of sulphur, 63
 Litre, 5
 Lobelia, 163
 Lobeline, 165
 Logwood, 152
 Lotion, 19
 Lupulin, 132
 Lupulina, 132
 Lupuline, 132
 Lupulinum, 132
 Lute, 16
 Lycopodium, 141
 Lye, 63

 Mace, 126
 Maceration, 23
 Macis, 126
 Magnesia, 77
 Magnesium, 77
 Magnolia, 135
 Magnolin, 135
 Male fern, 135
 Maltum, 104
 Manganese, 83
 Manna, 109
 Margarin, 139
 Marigold, 133
 Marrubiin, 123
 Marrubium, 123
 Marshmallow, 108
 Masse, 44
 Mastic, 137
 Matigo, 130
 Matricaria, 134
 Measures, 4
 Mel, 33, 109
 Melaleuca cajuputi, 125
 Melia azedarach, 145
 Melissa, 123
 Menes-cus, 8
 Menispermum, 162
 Menstruum, 24, 100
 Mentha piperita, 121
 Menthol, 21
 Mercury, 92
 Methyl salicylas, 126
 Metre, 4-5

 Metrology, 4
 Mezereum, 134
 Micromillimeter, 6
 Mills, 17
 Misturæ, 33
 Mixtures, 34
 Monsel's solution, 88
 Morphia, 154
 Morphina, 154
 Mortar, 18
 Moschus, 165
 Mucilages, 33
 Musk, 165
 Mustard, 129
 Myrrh, 138
 Myristica, 126

 Naphtalene, 103
 Naphtalin, 139
 Naphtalinum, 103
 Naphtol, 103
 Narcotine, 154
 Nataloin, 150
 Neutral mixture, 67
 Nickel, salts of, 89
 Nicotiana tabacum, 164
 Nicotine, 164
 Nitre, 71
 cubic, 71
 sweet spirit, 114
 Nitro-benzol, 128
 Nitrogenated oils, 116
 Nomenclature, 2
 Nucin, 149
 Nutgall, 151
 Nutmeg, 126
 Nux vomica, 157

 Official description, 3
 Oil of amber, 103
 Oil of cade, 32
 Oils, essential, 119
 fixed, 139
 Ointments, 48
 Oleata, 36
 Oleates, 36
 Olein, 139
 Oleoresinæ, 41
 Oleoresins, 41, 130
 Olive oil, 140
 Operations requiring heat,
 14
 Ophelia chirata, 144
 Opium, 154
 Orange, 120
 Organic chemistry, 100
 Origanum, 123
 Otto rose, 153
 Ounce, 4
 Ox gall, 166
 Oxygen, 52

 Palmitin, 139

 Pancreatin, 164
 Papaver somniferum, 154
 Papers, 49
 Paraffin, 143
 Paraldehyde, 115
 Parchment paper, 100
 Pareira, 162
 Parigenin, 147
 Parillin, 147
 Paullinia sorbilis, 163
 Pearlash, 63
 Pectase, 119
 Pectin, 119
 Pelletierine, 162
 Pellitory, 135
 Pelosine, 162
 Pennyroyal, 122
 Pepo, 141
 Pepper, 130
 Peppermint, 121
 Pepsin, 164
 Pepsinum, 164
 Percolation, 23
 Pèse acidi, 10
 esprit, 10
 sirop, 10
 Pestle, 18
 Petrolatum, 142
 Phæoretin, 147-148
 Pharmacopœias, 1
 Phenylacetamide, 104
 Phenol, 104
 Phosphorus, 58
 Physosterin, 158
 Physostigma, 158
 Physostigminæ salicylas,
 158
 Phytolacca, 134
 Picroconitine, 162
 Picropodophyllin, 142
 Picrosclerotin, 145
 Picrotoxin, 146
 Picrotoxinum, 146
 Pills, 45
 Pilocarpene, 160
 Pilocarpine, 160
 Pilocarpus, 160
 Pilulæ, 45
 Pimenta, 125
 Pimpinodophyllin, 124
 Pinkroot, 145
 Pinus australis, 156
 palustris, 102
 Piper, 130
 Piperidine, 130
 Piperina, 130
 Piperine, 130
 Pipette, 8
 Pipsissewa, 153
 Pitch, 137
 Pix burgundica, 137
 canadensis, 137
 liquida, 102
 Plasters, 49
 Pleurisy root, 135
 Platinum, 98

- Plumbum, 89
 Plummer's pills, 96
 Podophyllotoxin, 149
 Podophyllum, 149
 Poison ivy, 147
 Pokeberry, 135
 root, 134
 Polychroit, 146
 Polygala senega, 147
 Pomegranate, 162
 Porphyziation, 18
 Potash, 63
 Potassium, 62
 Pound, 5
 Powders, 44
 fineness of, 18
 Powdering, 17
 Precipitate red, 94
 white, 92
 Precipitation, 21
 Preparations, forms of, 30
 Prickly ash, 135
 Prinos, 145
 Prune, 148
 Prunum, 148
 Prunus virginiana, 128
 Pseudaconine, 162
 Pseudoaconitine, 162
 Pseudojervine, 161
 Pseudopelletierine, 162
 Pterocarpin, 147
 Pterocarpus marsupium, 147
 santalinus, 147
 Pulsatilla, 135
 Pulveres, 44
 Pulverizing, 19
 Pumpkin seed, 141
 Punica granatum, 162
 Purging cassia, 148
 Pyrethrum, 135
 Pyrogallol, 152
 Pyroxylol, 101
 Pyroxylum, 101
 Pyroxylon, 101

 Quassia, 144
 Quassin, 144
 Queen's root, 135
 Quercitrin, 152
 Quercus alba, 152
 Quicksilver, 92
 Quillaia, 147
 Quince seed, 108
 Quinidine, 156
 Quinina, 156
 Quinine, 156
 Quinoidin, 156
 Quinovin, 156

 Rasping, 17
 Receivers, 16
 Red precipitate, 94
 Red saunders, 147

 Reduced iron, 84
 Repercolation, 29
 Resin, 136
 Resina, 137
 Resinæ, 43
 Resins, 136, 43
 Resorcin, 104
 Resorcinum, 104
 Retort, 16
 Rhamnoxanthin, 149
 Rhamnus frangula, 149
 purshiana, 149
 Rhatany, 152
 Rheum, 148
 Rhubarb, 148
 Rhus glabrum, 118, 153
 Rhus toxicodendron, 146
 Ricinolein, 141
 Ricinus communis, 141
 Roasting, 13
 Rochelle salt, 65
 Rose, 152
 Rosemary, 122
 Rosmarinus, 122
 Rottlera, 148
 Rottlerin, 148
 Rubijervine, 161
 Rubra, 153
 Rubus, 153
 canadensis, 153
 idæus, 119
 trivialis, 153
 Rue, 130
 Rum, 111
 Rumex, 149
 Rumicin, 149
 Ruta, 131
 graveolens, 131

 Sabina, 133
 Saccharometer, 11
 Saccharose, 108
 Saccharum, 108
 lactis, 166
 Saffron, 146
 Sage, 123-153
 Sal ammoniac, 75
 Salicin, 145
 Salicinum, 145
 Saligenin, 145
 Salix alba, 145
 Salol, 104
 Salt, common, 71
 Epsom, 77
 Rochelle, 65
 Sal tartar, 67
 Saltpetre, 71
 Chili, 71
 Salvia, 123, 153
 Salviol, 123
 Sambucus, 132
 Sandal oil, 130
 Sanguinaria, 161
 Sanguinarine, 161

 Santalum album, 130
 rubrum, 147
 Santol, 147
 Saponica, 146
 Saponin, 146
 Santoninum, 146
 Sapo, 142
 mollis, 142
 viridis, 142
 Sapogenin, 147
 Saponin, 147
 Sarothamnus scoparius, 131
 Sarsaparilla, 147
 Sassafras, 126
 medulla, 106
 Savine, 133
 Scales, 7
 Scammoninm, 149
 Scammony, 149
 Scilla, 145
 Scillain, 145
 Scillin, 145
 Scillipicrin, 145
 Scillitoxin, 145
 Sclerocrystallin, 146
 Scleroidin, 146
 Scleromucin, 146
 Scleroxanthin, 146
 Scoparin, 131
 Scoparius, 130
 Scruple, 4
 Scullcap, 123
 Scutellaria, 123
 Secale cereale, 146
 Sediment, 21
 Seidlitz powder, 44
 Senega, 147
 Senegin, 147
 Senna, 147
 Separation, 19
 Serpentaria, 130
 Sesamum, oil, 140
 Sevum, 164
 Sieves, 18
 Silicon, 62
 Silver, 91
 salts, 91
 Sinalbin, 129
 Sinapis, 129
 Siphon, 20
 Smilax, 147
 Snakeroot, 131, 135
 Soap, 142
 Socaloin, 150
 Soda, 68
 Sodium, 62
 salts, 68
 Solanum dulcamara, 160
 Solution, 19
 Solutions, 30, 31
 alcoholic, 34
 Fowler's, 67
 Labarraque's, 67
 oleaginous, 36
 Solvay's process, 70
 Solvent, 19

- Spanish flies, 167
 Sparteina sulphate, 160
 Sparteine, 160
 Spatulas, 18
 Spearmint, 22
 Specific gravity, 8
 Spermaceti, 166
 Spigelia, 145
 Spirit frumenti, 111
 mindererus, 75
 vini gallici, 117
 Spirits, 34
 Spiritus, 34
 ætheris, 113
 compositus, 113
 nitrosi, 114
 glonoini, 118
 vini gallici, 117
 Squill, 145
 Stamping, 17
 Staves-acre, 161
 Starch, 104
 jelly, 105
 Staphisagria, 161
 Staphisain, 161
 Steam, 13
 Stearin, 139
 Steam-oven, 119
 Stribium, 95
 Still, 17
 Stillingia, 135
 Storax, 138
 Storesin, 138
 Straining, 20
 Stramonium, 160
 Strontium salts, 80
 Strophanthus, 145
 Strychnine, 158
 Strychnos, ignatia, 158
 nux vomica, 157
 Styracin, 138
 Styraex, 138
 Styrol, 138
 Sublimation, 14, 17
 Suet, 164
 Sugar, 106
 of milk, 156
 of lead, 19
 sugars, 106
 Sulphocyanide of allyl, 129
 Sulphur, 2
 Sulphuretted hydrogen, 59
 Surchich, 113
 Sutherland, 123
 Sappositoria, 50
 Sappositorias, 50
 Sweet flag, 147
 Sweet spirit of nitre, 114
 Synonym formula, 2
 Synonyms, 2
 Syrup, 32
 Syrups, 32
 Tabacum, 163
 Tamarind, 118, 148
 Tanacetin, 133
 Tanacetum, 133
 Tansy, 133
 Tar, 101, 102, 103
 Taraxacin, 145
 Taraxacum, 145
 Tartar emetic, 95
 Tension of matter, 14
 Terebenum, 136
 Terebinthina, 136
 canadensis, 136
 Terpenes, 119
 Terpin hydrate, 136
 Terpini hydras, 136
 Theobroma, cacao, 141
 Thermometers, 11
 Thyme, oil of, 123
 Thymol, 128
 Thymus, 127
 Tigllii, oleum, 141
 Tin, 89
 Tincal, 69
 Tincturæ, 37
 Tinctures, 37
 Tobacco, 164
 Tolene, 138
 Tolu, 138
 Torrefaction, 13
 Torsion balances, 8
 Torula cerevisiæ, 110
 Toxicodendron, 147
 Toxiresin, 145
 Tragacanth, 107
 Triticin, 110
 Triticum, 110
 Trituration, 17, 18
 Triturations, 44
 Troches, 47
 Trochiscation, 18
 Trochisci, 47
 Tubing, 16
 Turpentine, 136
 Turpentine, Canada, 137
 Turpeth mineral, 94
 Ulmus, 107
 Unguenta, 48
 Urinometer, 111
 Uva ursi, 153
 Vacuum apparatus, 15
 Valerian, 132
 Vanilla, 125
 Vanillin, 125
 Vaporization, 14
 Vaseline, 143
 Veratrina, 161
 Veratrine, 161
 Veratroidine, 161
 Veratrum viride, 161
 Verdigris, 91
 Viburnin, 132
 Viburnum, 132
 Vina medicata, 39
 Vinegars, 42
 Vinum album, 39, 116
 fortius, 39, 116
 rubrum, 39, 116
 Virginia snakeroot, 131
 Vitellin, 167
 Vitellus, 167
 Vitis vinifera, 117
 Vitriol, blue, 91
 green, 87
 white, 81
 Volatile oils, 119
 Wahoo, 149
 Water, 52
 Waters, 30
 Wax, 168
 Weighing, 4
 Weight, 4
 Whisky, 111
 White arsenic, 95
 lead, 90
 oak, 152
 precipitate, 92
 wax, 168
 Wild cherry, 128
 Willow, 145
 Wine, 116
 red, 116
 white, 116
 Wines, 39
 Wintergreen, artificial oil
 of, 126
 Witchhazel, 153
 Worm, 17
 Wormseed, 132-146
 Wormwood, 133
 Xanthropuccine, 162
 Xanthroxylum, 135
 Yellow jasmine, 158
 wax, 168
 dock, 149
 Zea, 104
 Zinc, 80
 Zincum, 80
 Zingiber, 129

BOOKS

FOR

STUDENTS,

INCLUDING THE

? QUIZ-COMPENDS ?

CONTENTS.

	PAGE		PAGE
New Series of Manuals, 2,3,4,5	5	Obstetrics,	10
Anatomy,	6	Pathology, Histology, . .	11
Biology,	11	Pharmacy,	12
Chemistry,	6	Physical Diagnosis, . . .	11
Children's Diseases, . . .	7	Physiology,	11
Dentistry,	8	Practice of Medicine, . .	11, 12
Dictionaries,	8, 16	Prescription Books, . . .	12
Eye Diseases,	8	? Quiz-Compend?	14, 15
Electricity,	9	Skin Diseases,	12
Gynecology,	10	Surgery and Bandaging, .	13
Hygiene,	9	Therapeutics,	9
Materia Medica,	9	Urine and Urinary Organs,	13
Medical Jurisprudence, .	10	Venereal Diseases, . . .	13
Nervous Diseases, . . .	10		

PUBLISHED BY

P. BLAKISTON, SON & CO.,

Medical Booksellers, Importers and Publishers.

LARGE STOCK OF ALL STUDENTS' BOOKS, AT
THE LOWEST PRICES.

1012 Walnut Street, Philadelphia.

*** For sale by all Booksellers, or any book will be sent by mail, postpaid, upon receipt of price. Catalogues of books on all branches of Medicine, Dentistry, Pharmacy, etc., supplied upon application.

GOULD'S }
DICTIONARY } See Page 16.

"An excellent Series of Manuals."—*Archives of Gynecology*.

A NEW SERIES OF STUDENTS' MANUALS

On the various Branches of Medicine and Surgery.

Can be used by Students of any College.

Price of each, Handsome Cloth, \$3.00. Full Leather, \$3.50

The object of this series is to furnish good manuals for the medical student, that will strike the medium between the compend on one hand and the prolix textbook on the other—to contain all that is necessary for the student, without embarrassing him with a flood of theory and involved statements. They have been prepared by well-known men, who have had large experience as teachers and writers, and who are, therefore, well informed as to the needs of the student.

Their mechanical execution is of the best—good type and paper, handsomely illustrated whenever illustrations are of use, and strongly bound in uniform style.

Each book is sold separately at a remarkably low price, and the immediate success of several of the volumes shows that the series has met with popular favor.

No. 1. SURGERY. 318 Illustrations.

Third Edition.

A Manual of the Practice of Surgery. By WM. J. WALSHAM, M.D., Asst. Surg. to, and Demonstrator of Surg. in, St. Bartholomew's Hospital, London, etc. 318 Illustrations.

Presents the introductory facts in Surgery in clear, precise language, and contains all the latest advances in Pathology, Antiseptics, etc.

"It aims to occupy a position midway between the pretentious manual and the cumbersome System of Surgery, and its general character may be summed up in one word—practical."—*The Medical Bulletin*.

"Walsham, besides being an excellent surgeon, is a teacher in its best sense, and having had very great experience in the preparation of candidates for examination, and their subsequent professional career, may be relied upon to have carried out his work successfully. Without following out in detail his arrangement, which is excellent, we can at once say that his book is an embodiment of modern ideas neatly strung together, with an amount of careful organization well suited to the candidate, and, indeed, to the practitioner."—*British Medical Journal*.

Price of each Book, Cloth, \$3.00; Leather, \$3.50.

No. 2. DISEASES OF WOMEN. 150 Illus. NEW EDITION.

The Diseases of Women. Including Diseases of the Bladder and Urethra. By DR. F. WINCKEL, Professor of Gynecology and Director of the Royal University Clinic for Women, in Munich. Second Edition. Revised and Edited by Theophilus Parvin, M.D., Professor of Obstetrics and Diseases of Women and Children in Jefferson Medical College. 150 Engravings, most of which are original.

"The book will be a valuable one to physicians, and a safe and satisfactory one to put into the hands of students. It is issued in a neat and attractive form, and at a very reasonable price."—*Boston Medical and Surgical Journal*.

No. 3. ANATOMY. Sixth Edition. 311 ILLUSTRATIONS.

HOLDEN'S ANATOMY. A Manual of the Dissections of the Human Body. By JOHN LANGTON, F.R.C.S., Surgeon to, and Lecturer on Anatomy at, St. Bartholomew's Hospital. Carefully Revised by A. HEWSON, M.D., Demonstrator of Anatomy, Jefferson Medical College; Chief of Surgical Clinic, Jefferson Hospital; Mem. Assoc. Amer. Anatomists, etc. 311 Illustrations. This book comes bound in oil-cloth—price \$3.00—as well as in the regular cloth and leather styles.

"The work before us is a brilliant example of the new order of text-books. * * * We would call special attention to the character of the illustrations with which the volume is bountifully furnished"—*American Journal of Mechanical Sciences*.

No. 4. PHYSIOLOGY. Sixth Edition. 254 ILLUSTRATIONS AND A GLOSSARY.

A Manual of Physiology. By GERALD F. YEO, M.D., F.R.C.S., Professor of Physiology in King's College, London. 254 Illustrations and a Glossary of Terms. Sixth American from last English Edition, revised and improved.

This volume was specially prepared to furnish students with a new text-book of Physiology, elementary so far as to avoid theories which have not borne the test of time and such details of methods as are unnecessary for students in our medical colleges.

"The brief examination I have given it was so favorable that I placed it in the list of text-books recommended in the circular of the University Medical College."—*Prof. Lewis A. Stimson, M.D., 37 East 33d Street, New York.*

Price of each Book, Cloth, \$3.00; Leather, \$3.50.

No. 5. DISEASES OF CHILDREN.**SECOND EDITION.**

A Manual. By J. F. GOODHART, M.D., Phys. to the Evelina Hospital for Children; Asst. Phys. to Guy's Hospital, London. Second American Edition. Edited and Rearranged by LOUIS STARR, M.D., Clinical Prof. of Dis. of Children in the Hospital of the Univ. of Pennsylvania, and Physician to the Children's Hospital, Phila. Containing many new Prescriptions, a list of over 50 Formulæ, conforming to the U. S. Pharmacopœia, and Directions for making Artificial Human Milk, for the Artificial Digestion of Milk, etc. Illus.

"The author has avoided the not uncommon error of writing a book on general medicine and labeling it 'Diseases of Children,' but has steadily kept in view the diseases which seemed to be incidental to childhood, or such points in disease as appear to be so peculiar to or pronounced in children as to justify insistence upon them. * * * A safe and reliable guide, and in many ways admirably adapted to the wants of the student and practitioner."—*American Journal of Medical Science.*

**No. 6. MATERIA MEDICA, PHARMACY,
PHARMACOLOGY, AND THE-
RAPEUTICS.**

A Handbook for Students. By WM. HALE WHITE, M.D., F.R.C.P., etc., Physician to, and Lecturer on Materia Medica, Guy's Hospital; Examiner in Materia Medica, Royal College of Physicians, London, etc. American Edition. Revised by REYNOLD W. WILCOX, M.A., M.D., Prof. of Clinical Medicine at the New York Post-Graduate Medical School and Hospital; Assistant Visiting Physician Bellevue Hospital. 580 pages.

In preparing this book, the wants of the medical student of to-day have been constantly kept in view. The division into several subjects, which are all arranged in a systematic, practical manner, will be found of great help in mastering the whole. The work of the editor has been mainly in the line of adapting the book to the use of American students; at the same time, however, he has added much new material. Dr. Wilcox's long experience in teaching and writing on therapeutical subjects particularly fits him for the position of editor, and the double authorship has resulted in making a very complete handbook, containing much minor useful information that if prepared by one man might have been overlooked.

Price of each Book, Cloth, \$3.00 : Leather, \$3.50.

No. 7. MEDICAL JURISPRUDENCE AND TOXICOLOGY.**THIRD REVISED EDITION.**

By JOHN J. REESE, M.D., Professor of Medical Jurisprudence and Toxicology in the University of Pennsylvania; President of the Medical Jurisprudence Society of Phila.; Third Edition, Revised and Enlarged.

"This admirable text-book."—*Amer. Jour. of Med. Sciences.*

"We lay this volume aside, after a careful perusal of its pages, with the profound impression that it should be in the hands of every doctor and lawyer. It fully meets the wants of all students. . . . He has succeeded in admirably condensing into a handy volume all the essential points."—*Cincinnati Lancet and Clinic.*

No. 8. DISEASES OF THE EYE. 176 Illus.**FOURTH EDITION.**

Diseases of the Eye and their Treatment. A Handbook for Physicians and Students. By HENRY R. SWANZY, A.M., M.B., F.R.C.S.L., Surgeon to the National Eye and Ear Infirmary; Ophthalmic Surgeon to the Adelaide Hospital, Dublin; Examiner in Ophthalmic Surgery in the Royal University of Ireland. Fourth Edition, Thoroughly Revised. 176 Illustrations and a Zephyr Test Plate. 500 pages.

"Mr. Swanzy has succeeded in producing the most intellectually conceived and thoroughly executed *résumé* of the science within the limits he has assigned himself. As a 'students' handbook,' small in size and moderate in price, it can hardly be equaled."—*Medical News.*

"A full, clear, and comprehensive statement of Eye Diseases and their treatment, practical and thorough, and we feel fully justified in commending it to our readers. It is written in a clear and forcible style, presenting in a condensed yet comprehensive form current and modern information that will prove alike beneficial to the student and general practitioner."—*Southern Practitioner.*

No. 9. MENTAL DISEASES.**WITH ILLUSTRATIONS. JUST READY.**

Lectures on Mental Diseases, designed for Medical Students and General Practitioners. By HENRY PUTNAM STEARNS, A.M., M.D., Physician Superintendent at the Hartford Retreat, Lecturer on Mental Diseases in Yale University, New Haven, Conn., Hon. Mem. British Psycho. Ass'n, etc. With Illustrations and a Digest of the Laws of the various States relating to the Commitment and Care of the Insane. 636 pages.

Price of each Book, Cloth, \$3.00; Leather, \$3.50.

ANATOMY.

Morris' New Text-Book on Anatomy. *Now Ready.* By ten leading Surgeons and Anatomists, and Edited by Henry Morris, F.R.C.S. 791 Specially Engraved Illustrations, 214 of which are printed in colors. Octavo. 1280 pages.

Price in Cloth, 7.50; Sheep, 8.50; Half Russia, 9.50

. Send for Descriptive Circular and Sample Pages.

Macalister's Human Anatomy. 816 Illustrations. A new Text-book for Students and Practitioners, Systematic and Topographical, including the Embryology, Histology, and Morphology of Man. With special reference to the requirements of Practical Surgery and Medicine. With 816 Illustrations, 400 of which are original. Octavo. Cloth, 7.50; Leather, 8.50

Ballou's Veterinary Anatomy and Physiology. Illustrated. By Wm. R. Ballou, M.D., Professor of Equine Anatomy at New York College of Veterinary Surgeons. 29 graphic Illustrations. 12mo. Cloth, 1.00; Interleaved for notes, 1.25

Holden's Dissector. A manual of Dissection of the Human Body. Sixth Edition. Edited by A. Hewson, M.D., Demonstrator of Anatomy at Jefferson Medical College. 311 Illustrations, many of which are new. Oil-cloth, 3.00; Sheep, 3.50

Holden's Human Osteology. Comprising a Description of the Bones, with Colored Delineations of the Attachments of the Muscles. The General and Microscopical Structure of Bone and its Development. With Lithographic Plates and Numerous Illustrations. Seventh Edition. 8vo. Cloth, 6.00

Holden's Landmarks, Medical and Surgical. 4th Ed. Clo., 1.25

Potter's Compend of Anatomy. Fifth Edition. Enlarged. 16 Lithographic Plates. 117 Illustrations. *See page 14.*

Cloth, 1.00; Interleaved for Notes, 1.25

CHEMISTRY.

Bartley's Medical Chemistry. Second Edition. A text-book prepared specially for Medical, Pharmaceutical, and Dental Students. With 50 Illustrations, Plate of Absorption Spectra, and Glossary of Chemical Terms. Revised and Enlarged. Cloth, 2.50

Trimble. Practical and Analytical Chemistry. A Course in Chemical Analysis, by Henry Trimble, Prof. of Analytical Chemistry in the Phila. College of Pharmacy. Illustrated. Fourth Edition, Enlarged. 8vo. Cloth, 1.50

Bloxam's Chemistry, Inorganic and Organic, with Experiments. Seventh Edition. 281 Illustrations. Cloth, 4.50; Leather, 5.50

 *See pages 2 to 5 for list of Students' Manuals.*

Chemistry:—Continued.

- Richter's Inorganic Chemistry.** Fourth American, from Sixth German Edition. Translated by Prof. Edgar F. Smith, PH.D. 89 Wood Engravings and Colored Plate of Spectra. Cloth, 2.00
- Richter's Organic Chemistry, or Chemistry of the Carbon Compounds.** Illustrated. Second Edition. Cloth, 4.50
- Symonds. Manual of Chemistry, for the special use of Medical Students.** By BRANDRETH SYMONDS, A.M., M.D., Asst. Physician Roosevelt Hospital, Out-Patient Department; Attending Physician Northwestern Dispensary, New York. Cloth, 2.00
- Leffmann's Compend of Chemistry.** Inorganic and Organic. Including Urinary Analysis. Third Edition. Revised. *See page 15.* Cloth, 1.00; Interleaved for Notes, 1.25
- Mûter. Practical and Analytical Chemistry.** Fourth Edition. Revised, to meet the requirements of American Medical Colleges, by Prof. C. C. Hamilton. Illustrated. Cloth, 1.25
- Holland. The Urine, Common Poisons, and Milk Analysis, Chemical and Microscopical.** For Laboratory Use. Fourth Edition, Enlarged. Illustrated. Cloth, 1.00
- Woody. Essentials of Chemistry for the Medical Student.** Third Edition. Cloth, 1.25

CHILDREN.

- Goodhart and Starr. The Diseases of Children.** Second Edition. By J. F. Goodhart, M.D., Physician to the Evelina Hospital for Children; Assistant Physician to Guy's Hospital, London. Revised and Edited by Louis Starr, M.D., Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania; Physician to the Children's Hospital, Philadelphia. Containing many Prescriptions and Formulæ, conforming to the U. S. Pharmacopœia, Directions for making Artificial Human Milk, for the Artificial Digestion of Milk, etc. Illustrated. Cloth, 3.00; Leather, 3.50
- Hatfield. Diseases of Children.** By M. P. Hatfield, M.D., Professor of Diseases of Children, Chicago Medical College. Colored Plate. 12mo. Cloth, 1.00; Interleaved, 1.25
- Starr. Diseases of the Digestive Organs in Infancy and Childhood.** With chapters on the Investigation of Disease, and on the General Management of Children. By Louis Starr, M.D., Clinical Professor of Diseases of Children in the University of Pennsylvania. Illus. Second Edition. Cloth, 2.25

See pages 14 and 15 for list of Quiz-Compendis!

DENTISTRY.

- Fillebrown.** Operative Dentistry. 330 Illus. Cloth, 2.50
Flagg's Plastics and Plastic Filling. 4th Ed. Cloth, 4.00
Gorgas. Dental Medicine. Fourth Edition. Cloth, 3.50
Harris. Principles and Practice of Dentistry. Including Anatomy, Physiology, Pathology, Therapeutics, Dental Surgery and Mechanism. Twelfth Edition. Revised and enlarged by Professor Gorgas. 1028 Illustrations. Cloth, 7.00; Leather, 8.00
Richardson's Mechanical Dentistry. Sixth Edition. By Warren. 600 Illustrations. 8vo. Cloth, 4.50; Leather, 5.50
Sewill. Dental Surgery. 200 Illustrations. 3d Ed. Clo., 3.00
Taft's Operative Dentistry. Dental Students and Practitioners. Fourth Edition. 100 Illustrations. Cloth, 4.25; Leather, 5.00
Talbot. Irregularities of the Teeth, and their Treatment. Illustrated. 8vo. Second Edition. Cloth, 3.00
Tomes' Dental Anatomy. Third Ed. 191 Illus. Cloth, 4.00
Tomes' Dental Surgery. 3d Edition. 292 Illus. Cloth, 5.00
Warren. Compend of Dental Pathology and Dental Medicine. Illustrated. 2d Ed. Cloth, 1.00; Interleaved, 1.25

DICTIONARIES.

- Gould's New Medical Dictionary.** Containing the Definition and Pronunciation of all words in Medicine, with many useful Tables etc. $\frac{1}{2}$ Dark Leather, 3.25; $\frac{1}{2}$ Mor., Thumb Index, 4.25
Gould's Pocket Dictionary. 12,000 Medical Words Pronounced and Defined. Containing many Tables and an Elaborate Dose List. Thin 64mo. Leather, gilt edges, 1.00; with Thumb Index, 1.25
Harris' Dictionary of Dentistry. Fifth Edition. Completely revised by Prof. Gorgas. Cloth, 5.00; Leather, 6.00
Cleveland's Pronouncing Pocket Medical Lexicon. Small pocket size. Cloth, red edges .75 pocket-book style, 1.00
Longley's Pocket Dictionary. The Student's Medical Lexicon, giving Definition and Pronunciation, with an Appendix giving Abbreviations used in Prescriptions, Metric Scale of Doses, etc. 24mo. Cloth, 1.00; pocket-book style, 1.25

EYE.

- Hartridge on Refraction.** 5th Edition. Illus. Cloth, 2.00
Swanzy. Diseases of the Eye and their Treatment. 176 Illustrations. Fourth Edition. Cloth, 3.00; Leather, 3.50
Fox and Gould. Compend of Diseases of the Eye and Refraction. 2d Ed. Enlarged. 71 Illus. 39 Formulæ. Cloth, 1.00; Interleaved for Notes, 1.25

See pages 2 to 5 for list of Students' Manuals.

ELECTRICITY.

- Bigelow.** Plain Talks on Medical Electricity. Cloth, 1.00
Mason's Compend of Medical Electricity. Cloth, 1.00
Steavenson and Jones. Medical Electricity. A Practical Handbook. Just Ready. Illustrated. 12mo. Cloth, 2.50

HYGIENE.

- Coplin and Bevan.** Practical Hygiene. By W. M. L. Coplin, Adjunct Professor of Hygiene, Jefferson Medical College, Philadelphia, and Dr. D. Bevan. Illustrated. Cloth, 4.00
Parkes' (Ed. A.) Practical Hygiene. Seventh Edition, enlarged. Illustrated. 8vo. Cloth, 4.50
Parkes' (L. C.) Manual of Hygiene and Public Health. Second Edition. 12mo. Cloth, 2.50
Wilson's Handbook of Hygiene and Sanitary Science. Seventh Edition. Revised and Illustrated. Cloth, 3.25

MATERIA MEDICA AND THERAPEUTICS.

- Potter's** Compend of Materia Medica, Therapeutics, and Prescription Writing. Fifth Edition, revised and improved. *See page 15.* Cloth, 1.00; Interleaved for Notes, 1.25
Davis. Essentials of Materia Medica and Prescription Writing. By J. Aubrey Davis, M.D., Demonstrator of Obstetrics and Quiz-Master on Materia Medica, University of Pennsylvania. 12mo. Interleaved. Net, 1.50
Biddle's Materia Medica. Twelfth Edition. By the late John B. Biddle, M.D. Revised by Clement Biddle, M.D. 8vo. Illustrated. Cloth, 4.25; Leather, 5.00
Potter. Handbook of Materia Medica, Pharmacy, and Therapeutics. Including Action of Medicines, Special Therapeutics, Pharmacology, etc. By Saml. O. L. Potter, M.D., M.R.C.P. (Lond.), Professor of the Practice of Medicine in Cooper Medical College, San Francisco. Fourth Revised and Enlarged Edition. 776 pages. 8vo. Cloth, 4.00; Leather, 5.00
White and Wilcox. Materia Medica, Pharmacy, Pharmacology, and Therapeutics. A Handbook for Students. By Wm. Hale White, M.D., F.R.C.P., etc., Physician to and Lecturer on Materia Medica, Guy's Hospital. Revised by Reynold W. Wilcox, M.D., Professor of Clinical Medicine at the New York Post Graduate Medical School, Assistant Physician Bellevue Hospital, etc. American Edition. Clo., 3.00; Lea., 3.50

 *See pages 14 and 15 for list of Quiz-Compend?*

MEDICAL JURISPRUDENCE.

- Reese.** A Text-book of Medical Jurisprudence and Toxicology. By John J. Reese, M.D., Professor of Medical Jurisprudence and Toxicology in the Medical Department of the University of Pennsylvania; Physician to St. Joseph's Hospital. Third Edition. Cloth, 3.00; Leather, 3.50

NERVOUS DISEASES.

- Gowers.** Manual of Diseases of the Nervous System. A Complete Text-book. By William R. Gowers, M.D., Prof. Clinical Medicine, University College, London. Physician to National Hospital for the Paralyzed and Epileptic. Second Edition. Revised, Enlarged, and in many parts Rewritten. With many new Illustrations. Octavo. Vol. I. Diseases of the Nerves and Spinal Cord. 616 pages. Cloth, 3.50
Vol. II. Diseases of the Brain and Cranial Nerves. General and Functional Diseases. Cloth, 4.50
- Ormerod.** Diseases of Nervous System, Student's Guide to. By J. A. Ormerod, M.D., Oxon., F.R.C.P. (London), Member Pathological. Clinical, Ophthalmological, and Neurological Societies, Physician to National Hospital for Paralyzed and Epileptic and to City of London Hospital for Diseases of the Chest, Demonstrator of Morbid Anatomy, St. Bartholomew's Hospital, etc. With 75 Wood Engravings. Cloth, 2.00

OBSTETRICS AND GYNÆCOLOGY.

- Davis.** A Manual of Obstetrics. By Edw. P. Davis, Clinical Lecturer on Obstetrics, Jefferson Medical College, Philadelphia. Colored Plates, and 130 other Illustrations. 12mo. Cloth, 2.00
- Byford.** Diseases of Women. The Practice of Medicine and Surgery, as applied to the Diseases and Accidents Incident to Women. By W. H. Byford, A.M., M.D., Professor of Gynæcology in Rush Medical College and of Obstetrics in the Woman's Medical College, etc., and Henry T. Byford, M.D., Surgeon to the Woman's Hospital of Chicago. Fourth Edition. Revised and Enlarged. 306 Illustrations, over 100 of which are original. Octavo. 832 pages. Cloth, 5.00; Leather, 6.00
- Lewers' Diseases of Women.** A Practical Text-book. 139 Illustrations. Second Edition. Cloth, 2.50
- Parvin's Winckel's Diseases of Women.** Second Edition. Including a Section on Diseases of the Bladder and Urethra. 150 Illus. Revised. See page 3. Cloth, 3.00; Leather, 3.50
- Wells.** Compend of Gynæcology. Illustrated. Cloth, 1.00
- Winckel's Obstetrics.** A Text-book on Midwifery, including the Diseases of Childbed. By Dr. F. Winckel, Professor of Gynæcology, and Director of the Royal University Clinic for Women, in Munich. Authorized Translation, by J. Clifton Edgar, M.D., Lecturer on Obstetrics, University Medical College, New York, with nearly 200 handsome Illustrations, the majority of which are original. 8vo. Cloth, 6.00; Leather, 7.00

See pages 2 to 5 for list of New Manuals.

Obstetrics and Gynæcology:—Continued.

- Landis' Compend of Obstetrics.** Illustrated. 5th Edition, Enlarged. By Wells. Cloth, 1.00; Interleaved for Notes, 1.25
- Galabin's Midwifery.** By A. Lewis Galabin, M.D., F.R.C.P. 227 Illustrations. Leather, 3.50

PATHOLOGY, HISTOLOGY, ETC.

- Stirling. Outlines of Practical Histology.** A Manual for Students. 2d Edition. 368 Illustrations. 12mo. Cloth, 3.00
- Wethered. Medical Microscopy.** By Frank J. Wethered. M.D., M.R.C.P. 98 Illustrations. Cloth, 2.50
- Hall. Compend of General Pathology and Morbid Anatomy.** Illustrated. Cloth, 1.00; Interleaved, 1.25
- Gilliam's Essentials of Pathology.** A Handbook for Students. 47 Illustrations. 12mo. Cloth, 2.00
- Virchow's Post-Mortem Examinations.** 3d Ed. Cloth, 1.00

PHYSICAL DIAGNOSIS.

- Fenwick. Student's Guide to Physical Diagnosis.** 7th Edition. 117 Illustrations. 12mo. Cloth, 2.25
- Tyson's Student's Handbook of Physical Diagnosis.** Illustrated. 2d Edition. 12mo. Cloth, 1.50

PHYSIOLOGY.

- Yeo's Physiology.** Sixth Edition. The most Popular Students' Book. By Gerald F. Yeo, M.D., F.R.C.S., Professor of Physiology in King's College, London. Small Octavo. 254 carefully printed Illustrations. With a Full Glossary and Index. *See page 3.* Cloth, 3.00; Leather, 3.50
- Brubaker's Compend of Physiology.** Illustrated. Seventh Edition. Cloth, 1.00; Interleaved for Notes, 1.25
- Kirke's Physiology.** New 13th Ed. Thoroughly Revised and Enlarged. 502 Illustrations, some of which are printed in colors. (*Blakiston's Authorized Edition.*) Red Cl., 4.00; Leather, 5.00
- Landois' Human Physiology.** Including Histology and Microscopical Anatomy, and with special reference to Practical Medicine. Fourth Edition. Translated and Edited by Prof. Stirling. 845 Illustrations. Cloth, 7.00; Leather, 8.00
- "With this Text-book at his command, no student could fail in his examination."—*Lancet*
- Sanderson's Physiological Laboratory.** Being Practical Exercises for the Student. 350 Illustrations. 8vo. Cloth, 5.00

PRACTICE.

- Taylor. Practice of Medicine.** A Manual. By Frederick Taylor, M.D., Physician to, and Lecturer on Medicine at, Guy's Hospital, London; Physician to Evelina Hospital for Sick Children, and Examiner in Materia Medica and Pharmaceutical Chemistry, University of London. Cloth, 2.00; Leather, 2.50

See pages 14 and 15 for list of ? Quis-Compendis ?

Practice:—Continued.

Roberts' Practice. New Revised Edition. A Handbook of the Theory and Practice of Medicine. By Frederick T. Roberts, M.D., M.R.C.P., Professor of Clinical Medicine and Therapeutics in University College Hospital, London. Seventh Edition. Octavo. Cloth, 5.50; Sheep, 6.50

Hughes. Compend of the Practice of Medicine. 4th Edition. Two parts, each, Cloth, 1.00; Interleaved for Notes, 1.25

PART I.—Continued, Eruptive and Periodical Fevers, Diseases of the Stomach, Intestines, Peritoneum, Biliary Passages, Liver, Kidneys, etc., and General Diseases, etc.

PART II.—Diseases of the Respiratory System, Circulatory System, and Nervous System; Diseases of the Blood, etc.

Physicians' Edition. Fourth Edition. Including a Section on Skin Diseases. With Index. 1 vol. Full Morocco, Gilt, 2.50

From John A. Robinson, M.D., Assistant to Chair of Clinical Medicine, now Lecturer on Materia Medica, Rush Medical College, Chicago.

"Meets with my hearty approbation as a substitute for the ordinary note books almost universally used by medical students. It is concise, accurate, well arranged, and lucid, . . . just the thing for students to use while studying physical diagnosis and the more practical departments of medicine."

PRESCRIPTION BOOKS.

Wythe's Dose and Symptom Book. Containing the Doses and Uses of all the principal Articles of the *Materia Medica*, etc. Seventeenth Edition. Completely Revised and Rewritten. *Just Ready.* 32mo. Cloth, 1.00; Pocket-book style, 1.25

Pereira's Physician's Prescription Book. Containing Lists of Terms, Phrases, Contractions, and Abbreviations used in Prescriptions, Explanatory Notes, Grammatical Construction of Prescriptions, etc., etc. By Professor Jonathan Pereira, M.D. Sixteenth Edition. 32mo. Cloth, 1.00; Pocket-book style, 1.25

PHARMACY.

Stewart's Compend of Pharmacy. Based upon Remington's Text-book of Pharmacy. Fourth Edition, Revised in accordance with U. S. P., 1890. Cloth, 1.00; Interleaved for Notes, 1.25

Robinson. Latin Grammar of Pharmacy and Medicine. By H. D. Robinson, Ph.D., Professor of Latin Language and Literature, University of Kansas, Lawrence. With an Introduction by L. E. Sayre, Ph.G., Professor of Pharmacy in, and Dean of, the Dept. of Pharmacy, University of Kansas. 12mo. Second Edition. Cloth, 2.00

SKIN DISEASES.

Crocker. Diseases of the Skin, their Description, Pathology, Diagnosis, and Treatment, with Special Reference to the Skin Eruptions of Children. By H. Radcliffe Crocker, F.R.C.P., Physician for Diseases of the Skin in University College Hospital. Second Edition. Revised and Enlarged, with 92 Wood-cuts. Cloth, 5.00

Van Harlingen on Skin Diseases. A Handbook of the Diseases of the Skin. By Arthur Van Harlingen, M.D. 3d Edition. Enlarged and Illustrated. 12mo. *In Press.*

See pages 2 to 5 for list of New Manuals.

SURGERY AND BANDAGING.

Moullin's Surgery, by Hamilton. 600 Illustrations (some colored), 200 of which are original. Second Edition.

Cloth, net, 7.00; Leather, net, 8.00; Half Russia, net, 9.00

. Complete circulars, with sample pages and Illustrations, free upon application.

Jacobson. Operations in Surgery. A Systematic Handbook for Physicians, Students, and Hospital Surgeons. By W. H. A. Jacobson, B. A. Oxon., F.R.C.S. Eng.; Ass't Surgeon Guy's Hospital; Surgeon at Royal Hospital for Children and Women, etc. 199 Illustrations. 1006 pages. 8vo. Cloth, 5.00; Leather, 6.00

Heath's Minor Surgery, and Bandaging. Tenth Edition. 142 Illustrations. 60 Formulæ and Diet Lists. *In Press.*

Horwitz's Compend of Surgery, Minor Surgery and Bandaging, Amputations, Fractures, Dislocations, Surgical Diseases, and the Latest Antiseptic Rules, etc., with Differential Diagnosis and Treatment. By ORVILLE HORWITZ, B.S., M.D., Demonstrator of Surgery, Jefferson Medical College. 5th Edition. Enlarged and Rearranged. Many new Illustrations and Formulæ. 12mo. Cloth, 1.00; Interleaved for the addition of Notes, 1.25

. The new Section on Bandaging and Surgical Dressings consists of 32 Pages and 41 Illustrations. Every Bandage of any importance is figured. This, with the Section on Ligation of Arteries, forms an ample Text-book for the Surgical Laboratory.

Walsham. Manual of Practical Surgery. Third Edition. By WM. J. WALSHAM, M.D., F.R.C.S., Asst. Surg. to, and Demof. of Practical Surg. in, St. Bartholomew's Hospital; Surgeon to Metropolitan Free Hospital, London. With 318 Engravings. *See page 2.* Cloth, 3.00; Leather, 3.50

URINE, URINARY ORGANS, ETC.

Holland. The Urine, and Common Poisons and The Milk. Chemical and Microscopical, for Laboratory Use. Illustrated. Fourth Edition. 12mo. Interleaved. Cloth, 1.00

Ralfe. Kidney Diseases and Urinary Derangements. 42 Illustrations. 12mo. 572 pages. Cloth, 2.75

Marshall and Smith. On the Urine. The Chemical Analysis of the Urine. Colored Plates. 12mo. Cloth, 1.00

Memminger. Diagnosis by the Urine. Illus. Cloth, 1.00

Tyson. On the Urine. A Practical Guide to the Examination of Urine. With Colored Plates and Wood Engravings. Eighth Edition, Enlarged. 12mo. Cloth, 1.50

Van Nûys, Urine Analysis. Illus. Cloth, 2.00

VENEREAL DISEASES.

Hill and Cooper. Student's Manual of Venereal Diseases, with Formulæ. Fourth Edition. 12mo. Cloth, 1.00

 *See pages 14 and 15 for list of ? Quiz-Compend ?*

? QUIZ-COMPENDS ?

The Best Compends for Students' Use
in the Quiz Class, and when Pre-
paring for Examinations.

Compiled in accordance with the latest teachings of prominent Lecturers and the most popular Text-books.

They form a most complete, practical, and exhaustive set of manuals, containing information nowhere else collected in such a condensed, practical shape. Thoroughly up to the times in every respect, containing many new prescriptions and formulæ, and over two hundred and fifty illustrations, many of which have been drawn and engraved specially for this series. The authors have had large experience as quiz-masters and attachés of colleges, with exceptional opportunities for noting the most recent advances and methods.

Cloth, each \$1.00. Interleaved for Notes, \$1.25.

No. 1. HUMAN ANATOMY, "Based upon Gray." Fifth Enlarged Edition, including Visceral Anatomy, formerly published separately. 16 Lithograph Plates, New Tables, and 117 other Illustrations. By SAMUEL O. L. POTTER, M.A., M.D., M.R.C.P. (Lond.), late A. A. Surgeon U. S. Army, Professor of Practice, Cooper Medical College, San Francisco.

Nos. 2 and 3. PRACTICE OF MEDICINE. Fourth Edition. By DANIEL E. HUGHES, M.D., Demonstrator of Clinical Medicine in Jefferson Medical College, Philadelphia. In two parts.

PART I.—Continued, Eruptive, and Periodical Fevers, Diseases of the Stomach, Intestines, Peritoneum, Biliary Passages, Liver, Kidneys, etc. (including Tests for Urine), General Diseases, etc.

PART II.—Diseases of the Respiratory System (including Physical Diagnosis), Circulatory System, and Nervous System; Diseases of the Blood, etc.

. These little books can be regarded as a full set of notes upon the Practice of Medicine, containing the Synonyms, Definitions, Causes, Symptoms, Prognosis, Diagnosis, Treatment, etc., of each disease, and including a number of prescriptions hitherto unpublished.

No. 4. PHYSIOLOGY, including Embryology. Seventh Edition. By ALBERT P. BRUBAKER, M.D., Prof. of Physiology, Penn'a College of Dental Surgery; Demonstrator of Physiology in Jefferson Medical College, Philadelphia. Revised, Enlarged, with new Illustrations.

No. 5. OBSTETRICS. Illustrated. Fifth Edition. By HENRY G. LANDIS, M.D. Edited by WILLIAM H. WELLS, M.D., Assistant Demonstrator of Clinical Obstetrics, Jefferson College, Philadelphia. New Illustrations.

BLAKISTON'S ? QUIZ-COMPENDS ?

- No. 6. MATERIA MEDICA. THERAPEUTICS. AND PRESCRIPTION WRITING.** Fifth Revised Edition. With especial Reference to the Physiological Action of Drugs, and a complete article on Prescription Writing. Based on the Last Revision of the U. S. Pharmacopoeia, and including many unofficial remedies. By SAMUEL O. L. POTTER, M.A., M.D., M.R.C.P. (Lond.), late A. A. Surg. U. S. Army; Prof. of Practice, Cooper Medical College, San Francisco. Improved and Enlarged, with Index.
- No. 7. GYNÆCOLOGY.** A Compend of Diseases of Women. By WM. H. WELLS, M.D., Ass't Demonstrator of Obstetrics, Jefferson Medical College, Philadelphia. Illustrated.
- No. 8. DISEASES OF THE EYE AND REFRACTION,** including Treatment and Surgery. By L. WEBSTER FOX, M.D., Chief Clinical Assistant Ophthalmological Dept., Jefferson Medical College, etc., and GEO. M. GOULD, M.D. 71 Illustrations, 39 Formulæ. Second Enlarged and Improved Edition. Index.
- No. 9. SURGERY, Minor Surgery and Bandaging.** Illustrated. Fifth Edition. Including Fractures, Wounds, Dislocations, Sprains, Amputations, and other operations; Inflammation, Suppuration, Ulcers, Syphilis, Tumors, Shock, etc. Diseases of the Spine, Ear, Bladder, Testicles, Anus, and other Surgical Diseases. By ORVILLE HORWITZ, A.M., M.D., Demonstrator of Surgery, Jefferson Medical College. Revised and Enlarged. 98 Formulæ and 167 Illustrations.
- No. 10. CHEMISTRY.** Inorganic and Organic. For Medical and Dental Students. Including Urinary Analysis and Medical Chemistry. By HENRY LIEPMANN, M.D., Prof. of Chemistry in Penn'a College of Dental Surgery, Phila. Third Edition, Revised and Rewritten, with Index.
- No. 11. PHARMACY.** Based upon "Remington's Text-book of Pharmacy." By F. E. STEWART, M.D., PH.G., Quiz-Master at Philadelphia College of Pharmacy. Fourth Edition, Revised.
- No. 12. VETERINARY ANATOMY AND PHYSIOLOGY.** 29 Illustrations. By WM. R. BALLOU, M.D., Prof. of Equine Anatomy at N. Y. College of Veterinary Surgeons.
- No. 13. DENTAL PATHOLOGY AND DENTAL MEDICINE.** Containing all the most noteworthy points of interest to the Dental student. Second Edition. By GEO. W. WARREN, D.D.S., Clinical Chief, Penn'a College of Dental Surgery, Philadelphia. Second Edition, Enlarged and Illustrated.
- No. 14. DISEASES OF CHILDREN.** By DR. MARCUS P. HATFIELD, Prof. of Diseases of Children, Chicago Medical College. Colored Plate.
- No. 15. GENERAL PATHOLOGY AND MORBID ANATOMY.** By H. NEWBERRY HALL, M.D., Lecturer on Pathology and Surgery Post Graduate School; Surgeon Emergency Hospital, Chicago, etc. Illustrated.

Bound in Cloth, \$1. Interleaved, for the Addition of Notes, \$1.25.

None of these books are so complete in detail, concise in language, or so well printed and bound. Each one forms a complete set of notes upon the subject under consideration.

Illustrated Descriptive Circular Free.

23,000 COPIES
Of These Books Have Already Been Sold.

GOULD'S NEW MEDICAL DICTIONARY.

Based on Recent Medical Literature.



Small 8vo, Half Morocco, as above, with Thumb Index, . . \$4.25
Plain Dark Leather, without Thumb Index, 3.25

A compact, concise Vocabulary, including all the Words and Phrases used in medicine, with their proper Pronunciation and Definitions.

"One pleasing feature of the book is that the reader can almost invariably find the definition under the word he looks for, without being referred from one place to another, as is too commonly the case in medical dictionaries. The tables of the bacilli, micrococci, leucomaines and ptomaines are excellent, and contain a large amount of information in a limited space. The anatomical tables are also concise and clear. . . . We should unhesitatingly recommend this dictionary to our readers, feeling sure that it will prove of much value to them."—*American Journal of Medical Science.*

JUST PUBLISHED.

GOULD'S POCKET DICTIONARY. 12,000

Medical Words Pronounced and Defined.

Leather, gilt edges, \$1.00; with Thumb Index, \$1.25

A UNIQUE BOOK.

POTTER'S MATERIA MEDICA, PHARMACY AND THERAPEUTICS. Fourth Edition. Revised and Enlarged. A Handbook; including the Physiological Action of Drugs, Special Therapeutics of Diseases, Official and Extemporaneous Pharmacy, etc. By S. O. L. POTTER, M.A., M.D., Professor of the Practice of Medicine in Cooper Medical College, San Francisco; Late A. A. Surgeon, U. S. Army, etc. A new Edition in larger type. Octavo. Cloth, \$4.00; Leather, \$5.00.

DR. POTTER has become well known as an able compiler, by his *Compend of Anatomy*, and of *Materia Medica*, both of which have reached four editions. In this book, more elaborate in its design, he has shown his literary abilities to much better advantage, and all who examine or use it will agree that he has produced a work containing more correct information in a practical, concise form than any other publication of the kind. The plan of the work is new, and its contents have been combined and arranged in such a way that it offers a compact statement of the subject in hand.

PART I.—*MATERIA MEDICA AND THERAPEUTICS*, the drugs being arranged in alphabetical order, with the synonym of each first; then the description of the plant, its preparations, physiological action, and lastly its *Therapeutics*. This part is preceded by a section on the classification of medicines as follows: Agents acting on the Nervous System, Organs of Sense, Respiration, Circulation, Digestive System, on Metabolism (including Restoratives, Alteratives, Astringents, Antipyretics, Antiphlogistics and Antiperiodics, etc.). Agents acting upon Excretion, the Generative System, the Cutaneous Surfaces, Microbes and Ferments, and upon each other.

PART II.—*PHARMACY AND PRESCRIPTION WRITING*. Written for the use of physicians who put up their own prescriptions. It includes—Weights and Measures, English and the Metric Systems. Specific Gravity and Volume. Prescriptions.—Their principles and combinations; proper methods of writing them; abbreviations used, etc. Stock solutions and preparations, such as a doctor should have to compound his own prescriptions. Incompatibility, Pharmaceutical and Therapeutical. Liquid, Solid and Gaseous Extemporaneous Prescriptions.

PART III.—*SPECIAL THERAPEUTICS*, an alphabetical List of Diseases—a real INDEX OF DISEASES—giving the drugs that have been found serviceable in each disease, and the authority recommending the use of each; a very important feature, as it gives an authoritative character to the book that is unusual in works on Therapeutics, and displays an immense amount of research on the part of the author. 600 prescriptions are given in this part, many being over the names of eminent men.

THE APPENDIX contains lists of Latin words, phrases and abbreviations, with their English equivalents, used in medicine, Genitive Case Endings, etc. 36 Formulæ for Hypodermic Injections; a comparison of 10 Formulæ of Chlorodyne; Formulæ of prominent patent medicines; Poisons and their Antidotes; Differential Diagnosis; Notes on Temperature in Disease; Obstetrical Memoranda; Clinical Examination of Urine; Medical Ethics; Table of Specific Gravities and Volumes; Table showing the number of drops in a fluidrachm of various liquids and the weight of one fluidrachm in grains, and a table for converting apothecaries' weights and measures into grams.

A New Series of Manuals.

FOR MEDICAL STUDENTS.

UNIFORM IN SIZE, PRICE AND BINDING.

Price of Each Book, Cloth, \$3.00; Leather, \$3.50.

No. 1. SURGERY. Third Edition. Manual of the Practice of Surgery.

By WM. J. WALSHAM, M.D., Assistant Surgeon to, and Lecturer on Anatomy at, St. Bartholomew's Hospital, London, etc. 318 Illustrations.

Presents the introductory facts in Surgery in clear, precise language, and contains all the latest advances in Pathology, Antiseptics, etc.

"It aims to occupy a position midway between the pretentious manual and the cumbersome System of Surgery, and its general character may be summed up in one word—practical."—*The Medical Bulletin*.

"Walsham, besides being an excellent surgeon, is a teacher in its best sense, and having had very great experience in the preparation of candidates for examination, and their subsequent professional career, may be relied upon to have carried out his work successfully. Without following out in detail his arrangement, which is excellent, we can at once say that his book is an embodiment of modern ideas neatly strung together, with an amount of careful organization well suited to the candidate, and, indeed, to the practitioner."—*British Medical Journal*.

No. 2. DISEASES OF WOMEN. Second Edition. By Dr. F.

WINCKEL, Professor of Gynæcology, etc., Royal University of Munich.

The Translation Edited by Theophilus Parvin, M.D., Professor of Obstetrics and Diseases of Women and Children, Jefferson Medical College, Philadelphia. 150 Engravings, most of which are original.

This work has no superior as a text-book of Diseases of Women in regard to clearness and completeness, and in its presentation of the latest scientific knowledge, and of the best practical rules and methods of treatment.

"The book will be a valuable one to physicians, and a safe and satisfactory one to put into the hands of students. It is issued in a neat and attractive form, and at a very reasonable price."—*Boston Medical and Surgical Journal*.

No. 3. MIDWIFERY. By ALFRED LEWIS GALABIN, M.A., M.D., Obstetric

Physician to, and Lecturer on Midwifery and the Diseases of Women at, Guy's Hospital, London, etc. 227 fine Engravings.

"The illustrations are mostly new and well executed, and we heartily commend this book as far superior to any manual upon this subject."—*Archives of Gynæcology, New York*.

"Sensible, practical and complete."—*Medical Brief*.

"I have carefully read it over, and, as a teacher of midwifery, I consider the book ought to become one of the recognized text-books; the treatment and pathology of the various subjects treated are clear and concise."—*J. Algernon Temple, M.D., Prof. of Midwifery, and Gynæcology, Trinity Medical School, Toronto*.

No. 4. PHYSIOLOGY. Sixth Edition. By GERALD F. YEO, M.D.,

F.R.C.S., Professor of Physiology in King's College, London. Sixth American from Second English Edition. 321 carefully printed Illustrations.

"The work will take a high rank among the smaller text-books of Physiology."—*Prof. H. P. Bowditch, Harvard Medical School*.

"By his excellent manual, Prof. Yeo has supplied a want which must have been felt by every teacher of Physiology."—*The Dublin Journal of Medical Science*.

SEE NEXT PAGE.

P. BLAKISTON, SON & CO., Publishers and Booksellers,
1012 WALNUT STREET, PHILADELPHIA.

The New Series of Manuals—*Continued.*

No. 5. CHILDREN. Second Edition. Illustrated. By J. F. GOODHART, M.D., Physician to the Evelina Hospital for Children; Assistant Physician to Guy's Hospital, London. American Edition. Revised and Edited by LOUIS STARR, M.D., Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania; Physician to the Children's Hospital of Philadelphia. With Illustrations, 50 Formulæ, and Directions for preparing Artificial Human Milk, for the Artificial Digestion of Milk, etc.

"As it is said of some men, so it might be said of some books, that they are 'born to greatness.' This new volume has, we believe, a mission, particularly in the hands of the younger members of the profession. In these days of prolixity in medical literature, it is refreshing to meet with an author who knows both what to say and when he has said it."—*New York Medical Record.*

No. 6. MATERIA MEDICA, PHARMACY, PHARMACOLOGY, AND THERAPEUTICS. Just Ready. A Handbook for Students. By WILLIAM HALE WHITE, M.D., F. R. C. P., etc., Physician to, and Lecturer on Materia Medica, Guy's Hospital; Examiner in Materia Medica, Royal College of Physicians, London, etc. American Edition. Revised by REYNOLD W. WILCOX, M. A., M. D., Professor of Clinical Medicine at the New York Post-Graduate Medical School and Hospital; Assistant Visiting Physician Bellevue Hospital.

"Practical experience with Dr. White's book on general therapeutics, both as to its usefulness to the student and as to the soundness of the advice which he gives, has proved that he is an author upon whom much dependence may be placed, and a careful examination of the American version of his second work, which has been published under Dr. Wilcox's eye, shows that it is also worthy of both its author and editor."—*Therapeutic Gazette*, January 16, 1893.

No. 7. MEDICAL JURISPRUDENCE AND TOXICOLOGY. Third Edition. By JOHN J. REESE, M.D., Professor of Medical Jurisprudence and Toxicology, University of Pennsylvania, etc. Third Edition. Enlarged.

"The production of this admirable text-book by one of the two or three leading teachers of medical jurisprudence in America, will, we hope, give a new impetus to the study of forensic medicine, which, inviting and important as it is, has heretofore been strangely neglected in both legal and medical schools."—*American Journal of the Medical Sciences.*

"We heartily second the author's hope that this treatise may encourage an increasing interest in the students for that most important, but too much neglected, subject, forensic medicine."—*Boston Medical and Surgical Journal.*

No. 8. SWANZY. DISEASES OF THE EYE. Fourth Edition, Enlarged and Improved. Diseases of the Eye and their Treatment. A Handbook for Physicians and Students. By HENRY S. SWANZY, A. M., M. B., F. R. C. S. I., Surgeon to the National Eye and Ear Infirmary; Ophthalmic Surgeon to the Adelaide Hospital, Dublin; Examiner in Ophthalmic Surgery in the Royal University of Ireland. Fourth Edition, Thoroughly Revised. 170 Illustrations.

"Mr. Swanzy has succeeded in producing the most intellectually conceived and thoroughly executed *resumé* of the science within the limits he has assigned himself. As a 'students' handbook,' small in size and moderate in price, it can hardly be equaled."—*Medical News.*

* * * Other Volumes in Preparation. A complete illustrated circular, with sample pages, sent free upon application.

Price of Each Book, Cloth, \$3.00; Leather, \$3.50.

P. BLAKISTON, SON & CO., Publishers and Booksellers,
1012 WALNUT STREET, PHILADELPHIA.

NATIONAL LIBRARY OF MEDICINE



NLM 00068526 2